

Preliminary Utility Report

Bella Mesa North
SDP24-0040

Prepared for:

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WHERE GREAT PLACES BEGIN

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Revised June 24, 2025
March 3, 2025
December 3, 2024
Project No. 17026



ENGINEER'S CERTIFICATION

The enclosed utility report, and exhibits, were prepared by me or under my direct supervision and is correct to the best of my knowledge and belief. Said utility report has been prepared in accordance with applicable Town of Castle Rock criteria and is in conformance with the master utility plans for the affected area. I accept responsibility for any liability caused by negligent acts, errors, or omissions on my part in preparing this report.

Signature: _____

Evan Rumney, P.E.

Registered Professional Engineer

State Of Colorado No. 54401

Owner/Developer's Statement:

As Owner/Developer of Land(s) identified within this report; I agree to proceed, implement and comply with all recommendations and requirements outlined herein.

Name of Developer

Authorized Signature

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General Location and Description

Introduction

This report presents an analysis of the water and wastewater requirements for the Bella Mesa North subdivision, hereafter referred to as the Site.

Site Location

The Site is in portions of the Southwest quarter of Section 4, the Southeast quarter of Section 5, the North half of the Northeast quarter of Section 8 and the North half of the Northwest quarter of Section 9, Township 8 South, Range 66 West of the 6th P.M., in the County of Douglas, State of Colorado. See Appendix F for project Vicinity Map.

Description of Property and Land Use

The Site is roughly 293.2 acres undeveloped and located east of Mitchell Gulch and north of Mitchell Street, the Castlewood Ranch development, and the Founders Village Filing 24 development. Proposed development will include approximately 525 single family detached (SFD) dwellings, local roadways, open space, Site infrastructure, three detention ponds, and a proposed lift station to serve the Site. The Site generally slopes to the northwest and consist of native grasses and vegetation. See Appendix F for a conceptual the Site utility plan.

Calculated Water Demands

This report analyzes the water system that services the future Site's 525 SFE's. The proposed water flows for the Site have been calculated using the Town of Castle Rock Water System Design 2018 Criteria Manual. See relevant design criteria below:

Demand per SFE	400 gal/day/SFE (Single Family Residential/Duplex)
Maximum Day Factor	MDF = 2.5
Peak Hour Factor	PHF = 5.5
Maximum Day Demand	MDD = (Domestic ADD*MDF) + Irrigation ADD
Peak Hour Demand	PHD = (Domestic ADD*PHF) + Irrigation ADD

Average Day Demands (ADD)

Average Daily Demands were calculated using 400 gpd/SFE and 525 SFE for the design demand, resulting in an Average Daily Demand of 145.83 gpm excluding irrigation. Approximately 2.79 acres of the Site will be irrigated, using a land use rate of 3,750 gpd/acre for the design demand, resulting in the calculated total irrigation ADD of 7.27 gpm. Total ADD including irrigation was calculated to be 153.10 gpm. For complete calculations see Appendix A.

Residential Only

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Average Daily Demand	145.83	210,000	235.22

Residential & Irrigation

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Average Daily Demand	153.10	220,462.50	246.95

Maximum Day Demands (MDD)

Using the Maximum Day Factor of 2.5, the Maximum Day Demand was calculated to be 364.58 gpm excluding irrigation. Including irrigation the MDD was calculated to be 371.85 gpm, for complete calculations see Appendix A.

Residential Only

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Maximum Daily Demand	364.58	524,995	588.07

Residential & Irrigation

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Maximum Daily Demand	371.85	535,464	599.79

Peak Hour Demands (PHD)

Using the Peak Hour Factor of 5.5, the Peak Hour Demand was calculated to be 802.08 gpm excluding irrigation. Including irrigation the PHD was calculated to be 809.35 gpm, for complete calculations see Appendix A.

Residential Only

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Maximum Daily Demand	802.08	1,155,000	1,293.76

Residential & Irrigation

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Maximum Daily Demand	809.35	1,165,464	1,305.48

Existing Water System

The Site has two existing 12" water main stubs, located at each end of Mitchell Street on the south side of the development, please see Appendix F. Water services for the development are within the Green Zone, which is supplied by tanks near Ridge Road, as designated by the Town of Castle Rock.

Most of the development falls within the Green Zone, except for the northern section and a small portion along the western boundary. The northern section is outside any designated pressure zone, while the small western portion falls within the Red Zone. However, these areas do not require water services since housing is not planned in these areas, as they consist of steep cliff faces.

The elevation range of the proposed lots is 6573' - 6517'.

Proposed Water System

Proposed Distribution System

The proposed water system for the Site will connect to existing infrastructure at two points along the southern border. Both are existing 12" mains and located in Mitchell Street, one at the southwest corner of the Site and the other located at the southeast corner. The proposed water system will be composed of 12" and 8" diameter PVC and will be routed throughout the Site, being looped to both existing connection points.

The proposed water system will be constructed in concurrence with the 3-phase plan that has been developed for the Site.

Phase 1 contains 113 SFD lots, and Phase 1.5 contains 119 SFD lots, combined they total 232 SFD lots and make up the majority of the southern portion of the Site. This phase will construct a 12" water main through Mitchell Street and Street B, accompanied by 8" mains throughout the local streets. Multiple 8" stubs and a 12" stub will be constructed for the future connection points into Phase 2. This phase connects to both existing water connection points that will serve the Site.

Phase 2 contains 137 SFD lots and makes up the central part of the overall Site. This phase will connect to the existing stubs previously constructed in phases 1 and 1.5. The water mains constructed in this phase will consist of the continuation of the 12" main in Mitchell Street accompanied by 8" mains throughout the rest of the local streets. Future 8" stubs will also be constructed in this phase as connection points for future Phase 3.

Phase 3 is the northern most and final phase for the development of this Site, it will consist of 156 SFD lots. This phase will connect to the existing stubs previously constructed in phase 2. Only 8" mains will be constructed in local streets to serve this remaining portion of the Site.

Proposed Supply Facilities

The Site is served by the Green Zone Water Tanks 6A and 6C, with the combined capacity of 4.22 MG.

Required storage needed for the Site is based on proposed demands and is calculated below.

Storage Volume = Maximum Day Demand + Fire Flow
= (364.58gpm * 60min/hr * 24hrs) + (1500gmp * 60 min/hr * 2hrs)
= 525,000 gallons + 180,000 gallons
Storage Volume = 705,000 gallons (0.705 MG)

Land Dedication Requirements

To support the municipal water supply for the property, the owner must convey water rights to the Town. The Town will not grant land use approvals for any additional development until this requirement is met. Water rights have already been transferred to the Town, and the site requires 525 SFE for domestic supply and 26.2 SFE anticipated for irrigation. Only permanently irrigated areas were used to calculate the anticipated SFE's, which excludes areas such as native grasses. A water credit of 276.2 SFE units was applied to the water bank when the rights were transferred. The Site will require 275 SFE's total. The Town has agreed to allow the purchase of these additional units at a fee-in-lieu rate, please see the Bella Mesa North and South Water Budget Letter by Redland dated October 10th, 2024 in Appendix G.

Proposed water infrastructure not located within public right-of-way will be within a dedicated utility easement for access and maintenance. The minimum width of the easement is 20' for one utility, 30' for two utilities, and 40' for three utilities per the Town of Castle Rock Water System Design 2018 Criteria Manual. These will be dedicated on the final plat. Any future development of the existing water infrastructure needed to serve the Site is the responsibility of the developer.

Proposed Water System Analysis and Modeling

The proposed water analysis and modeling has been done in accordance with The Town of Castle Rock criteria. It requires the water distribution pipe system to deliver Maximum Day plus Fire Flows demand with a minimum dynamic pressure of 20 psi and a maximum velocity of 15 fps. The Town also requires the system to deliver Peak Hour demands with a minimum pressure of 25 psi and a maximum velocity of 10 fps under the same conditions. In addition, the minimum static pressure with zero demand criteria (20% tank stage) is 43 psi and the maximum static pressure with zero demand criteria (100% tank stage) is 125 psi.

Different flow models were completed and compared to the corresponding Town criteria. The models consisted of Average Day, Maximum Day, Maximum Day plus Fire Flow, Peak

Hour, and both minimum and maximum static pressures with zero demand. The minimum static pressure (20% tank stage) HGL elevation used in the model was 6805', and the maximum static pressure (100% tank stage) HGL used in the model was 6824'.

Each model contains two outputs. The first being the Junction Report, which is used to check water pressure in the model against the Town's criteria. The second is the Pipe Report, which is used to check velocities and head loss against the Town's criteria. Full results for each scenario can be found in Appendix C.

The proposed water distribution system within the Site has met most of the Town of Castle Rocks criteria. The Maximum Day plus Fire Flow minimum network pressure was modeled at Junction C5, the point of lowest pressure, and Junction L10, the most remote hydrant location within the network. When Junction C5 was modeled the maximum velocity was 5.28 fps, and when Junction L10 was modeled the maximum velocity was 6.19 fps. This meets the Town's criteria of a minimum dynamic pressure of 20 psi and maximum velocity of 15 fps.

The Peak Hour minimum network pressure was modeled to be 102 psi at Junction C6, and the maximum velocity was modeled to be 1.13 fps. This meets the Town's criteria of a minimum dynamic pressure of 35 psi and maximum velocity of 10 fps.

The minimum static pressure (20% tank stage) network was modeled to be 103 psi at Junction C5 and C6. This meets the Town's criteria of a minimum static pressure of 43 psi.

The maximum static pressure (100% tank stage) network was modeled to be 136 psi at Junction L10. This does not meet the Town's criteria of a maximum static pressure of 125 psi. The reason for this being that the westerly portion of the Site is located within a range of elevations that fall within Castle Rocks Red Pressure Zone, while the existing stubs provided for the Site utilize Green Zone Tanks. Due to this range of elevations, pressures within the westerly portion of the Site exceed the maximum static pressures criteria. Single-family detached lots that fall within these high-pressure areas will have to utilize water service lines fitted with pressure regulating valves (PRVs) to maintain adequate pressure. A Technical Criteria Variance application has been submitted due to exceeding the Town's criteria for maximum static pressure.

Calculated Wastewater Flows

This report analyzes the sanitary sewer system that services the future Site's 525 SFE's. The proposed wastewater flows for the Site have been calculated using the Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual. See relevant design criteria below:

Demand per SFE	200 gal/day/SFE (Single Family Residential/Duplex)
Peak Factor	PF = 5.0
Infiltration/Inflow	I/I = 0.10*ADF
Peak Design Flow	PDF = (ADF*PF) + (I/I)

Average Day Wastewater Flows (ADF)

Average Daily Flows were calculated using 200 gpd/SFE and 525 SFE for the design basin, resulting in an Average Daily Flow of 72.92 gpm, for complete calculations see Appendix D.

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Cubic Feet Per Second (cfs)
Average Daily Flow	72.92	105,000	0.16

Peaking Factor

A maximum peaking factor of 5.0 was used to determine a Peak Design Flow for the Site. This demand includes infiltration/inflow demands, for complete calculations see Appendix D.

Peak Design Flows (PDF)

Using the Peaking Factor of 5.0, the Peak Design Flow was calculated to be 364.58 gpm. Including Infiltration/Inflow the Peak Design Flow was calculated to be 371.88 gpm, for complete calculations see Appendix D.

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Cubic Feet Per Second (cfs)
Peak Design Flow	364.58	525,000	0.81
Peak Design Flow w/ Infiltration	371.88	535,500	0.83

Existing Wastewater System**Existing Collection System**

An existing 6" sanitary sewer force main is located within Mitchell Street, at the southern boundary of the Site. The 6" force main runs north and west eventually connecting into a 18" gravity sanitary sewer main running east-west. The existing 6" force main stub in Mitchell Street will provide a connection point for the Site. All wastewater ultimately discharges into a 12" gravity sanitary sewer main southwest of Mesa Middle School. The Town of Castle Rock Wastewater Master Plan, dated 2022, references the Bella Mesa (Founders Village F24) development as a future site that anticipates the construction of a new lift station and associated force/gravity sanitary sewer mains. See page 23 of the Town's Master Plan for more information.

Proposed Wastewater System

Proposed Collection System

It is anticipated that the Site will be serviced by 8" in diameter sanitary sewer mains throughout the Site. Due to topographical constraints, the Site will consist of both gravity and pressurized systems. Internally to the Site, gravity mains will convey wastewater to the northwest. At which point a proposed lift station will pump flows south to connect to the existing 6" force main stub located within Mitchel Street.

Proposed Wastewater Facilities

The Town of Castle Rock requires further investigation of the 6" force main to ensure its integrity and function. This will include but is not limited to, underground video observation of force main and manholes. Design of the force main and lift station will be required to conform to the Town of Castle Rock Wastewater Collection Systems Design Criteria Manual.

It is the responsibility of the owner to construct the proposed lift station as part of the initial facilities necessary for the Site. The lift station must be operational before the first building permit will be issued for the Site. The lift station will be located at the northwestern corner of the Site and will be owned and maintained by the Town of Castle Rock. For more information regarding the proposed lift station, please see the "Sunset Point Lift Station – Preliminary Engineering Report" in Appendix H.

Land Dedication Requirements

Sanitary sewer infrastructure not located within public right-of-way will be within a dedicated utility easement for access and maintenance. The minimum width of the easement is 20' per the Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual. Any future development of the existing wastewater infrastructure needed to serve the Site is the responsibility of the developer.

Proposed Wastewater System Analysis and Modeling

The proposed wastewater analysis and modeling has been done in accordance with The Town of Castle Rock criteria. HydroFlow Express was used to analyze the sanitary pipe capacity and velocities for the development. See Appendix E for results of the modeling. Design constraints considered in the model are as follows:

Manning's Coefficient (PVC)	0.011
Maximum Velocity at Peak Design Flow	10 fps
Minimum Velocity at Peak Design Flow	2 fps
Minimum Pipe Slope (8 in)	0.4%
Maximum Pipe Slope (8in)	7.5%
Full Flow Capacity	75%

Average Day and Peak Design Flow scenarios were modeled to analyze the proposed pipe capacities and velocities. Both minimum and maximum velocity requirements were met at Peak Design Flows.

Peak Design Flow was calculated to be 0.83 cfs, the resulting pipe velocity was modeled to be 2.93 fps at a minimum pipe slope of 0.4%, this meets the Town's minimum velocity criteria. The pipe velocity was also modeled to be 8.75 fps at a maximum pipe slope of 7.5%, this meets the Town's maximum velocity criteria.

Potential Permitting Requirements

Permits for the proposed development will be applied for through the Town of Castle Rock and the State of Colorado, where applicable. Permits will be in place prior to the start of construction.

References

1. *Town of Castle Rock Water System Design 2018 Criteria Manual*, dated December 4, 2018.
2. *Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual*, dated December 4, 2018.
3. *Town of Castle Rock, 2022 Wastewater Master Plan*, dated 2022.
4. *Town of Castle Rock, 2023 Water Master Plan*, dated 2023.

Appendix A – Water Demands

Bella Messa North
Preliminary Utility Report

Redland
6/24/2025

Water Demands

Maximum Day Demand (MDD) 2.5
Peak Hour Demand (PHD) 5.5

Redistential Only

Phase (SF -Residential)	Use	Dwelling Units	Area (AC)	Equivalent (SFE/DU)	SFE	Avg Day Demand (GPD/DU)	Avg Day (GPM/SFE)	Avg Day Demand (GPD)	Avg Day Demand (GPM)	Maximum Day Demand (GPM)	Peak Hour Demand (GPM)
1	SF	113	45.3	1.00	113.00	400	0.28	45,200.00	31.39	78.47	172.64
1.5	SF	119	39.5	1.00	119.00	400	0.28	47,600.00	33.06	82.64	181.81
2	SF	137	43.2	1.00	137.00	400	0.28	54,800.00	38.06	95.14	209.31
3	SF	156	165.2	1.00	156.00	400	0.28	62,400.00	43.33	108.33	238.33
Totals:	-	525	293.2	-	525.00	-	1.11	210,000.00	145.83	364.58	802.08

*Per Town Of Castle Rock Water System Desing 2018 Criteria Manual, Section 4.4.1

Irrigation

Phase	Use	Irrigated Area (AC)	Land Use Rate (GPD/AC)	Avg Day Demand (GPD)	Avg Day Demand (GPM)
1 - 3	IRR	2.79	3,750.00	10,462.50	7.27

*Per Town Of Castle Rock Water System Desing 2018 Criteria Manual, Section 4.4.1

Residential & Irrigation

Phase	Use	Avg Day Demand (GPD)	Avg Day Demand (GPM)	Maximum Day Demand (GPM)	Peak Hour Demand (GPM)
1 - 3	SF & IRR	220,462.50	153.10	371.85	809.35

*Per Town Of Castle Rock Water System Desing 2018 Criteria Manual, Section 4.4.1

Appendix B – Water Storage

Water Storage
Maximum Day Demand (MDD) 2.5

Type	Use	Dwelling Units	Area (AC)	Equivalent (SFE/DU)	SFE	Avg Day Demand (GPD/DU)	Avg Day (GPM/SFE)	Avg Day Demand (GPD)	Avg Day Demand (GPM)	Maximum Day Demand (GPM)	Total (gallons)
Bella Mesa North	SF	525	293.2	1.00	525.00	400	0.28	210,000.00	145.83	364.58	525,000.00
Fire Flow (1500 gpm @ 2 hrs)											180,000.00
Totals:											705,000.00

*Per Town Of Castle Rock Water System Desing 2018 Criteria Manual, Section 4.4.1

Appendix C – Water Hydraulic Analysis and Modeling

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 100%

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,824.00	126
J-B2	6,533.99	0	6,824.00	125
J-B3	6,548.84	0	6,824.00	119
J-B4	6,557.42	0	6,824.00	115
J-B5	6,565.21	0	6,824.00	112
J-C1	6,544.27	0	6,824.00	121
J-C2	6,546.33	0	6,824.00	120
J-C3	6,553.21	0	6,824.00	117
J-C4	6,561.66	0	6,824.00	114
J-C5	6,566.37	0	6,824.00	111
J-C6	6,568.06	0	6,824.00	111
J-C7	6,543.80	0	6,824.00	121
J-C8	6,534.75	0	6,824.00	125
J-C9	6,528.49	0	6,824.00	128
J-C10	6,526.65	0	6,824.00	129
J-D1	6,522.51	0	6,824.00	130
J-E1	6,527.57	0	6,824.00	128
J-E2	6,523.59	0	6,824.00	130
J-E3	6,518.44	0	6,824.00	132
J-E4	6,514.86	0	6,824.00	134
J-F1	6,533.99	0	6,824.00	125
J-F2	6,529.69	0	6,824.00	127
J-F3	6,526.75	0	6,824.00	129
J-H1	6,545.49	0	6,824.00	120
J-H2	6,528.26	0	6,824.00	128
J-H3	6,523.79	0	6,824.00	130
J-H4	6,519.73	0	6,824.00	132
J-H5	6,516.12	0	6,824.00	133
J-H6	6,517.18	0	6,824.00	133
J-H7	6,524.06	0	6,824.00	130
J-H8	6,527.29	0	6,824.00	128
J-H9	6,536.51	0	6,824.00	124
J-J1	6,554.69	0	6,824.00	117
J-J2	6,546.94	0	6,824.00	120
J-L1	6,556.36	0	6,824.00	116
J-L2	6,548.78	0	6,824.00	119
J-L3	6,543.55	0	6,824.00	121
J-L4	6,538.83	0	6,824.00	123
J-L5	6,534.10	0	6,824.00	125
J-L6	6,528.03	0	6,824.00	128
J-L7	6,521.60	0	6,824.00	131
J-L8	6,517.62	0	6,824.00	133
J-L9	6,513.52	0	6,824.00	134
J-L10	6,510.06	0	6,824.00	136
J-M1	6,522.82	0	6,824.00	130
J-M2	6,530.94	0	6,824.00	127
J-M3	6,534.97	0	6,824.00	125
J-M4	6,542.86	0	6,824.00	122
J-M5	6,535.42	0	6,824.00	125

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 100%

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M6	6,527.96	0	6,824.00	128
J-P1	6,549.00	0	6,824.00	119
J-P2	6,554.43	0	6,824.00	117
J-P3	6,558.26	0	6,824.00	115
J-R1	6,545.43	0	6,824.00	121
J-R2	6,552.17	0	6,824.00	118
J-R3	6,559.94	0	6,824.00	114

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,824.00	0	6,824.00
R-2	6,824.00	0	6,824.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 100%

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	0	0.00	0.00
172	J-C1	J-C2	8.0	PVC	120.0	0	0.00	0.00
842	J-C1	J-B1	12.0	PVC	120.0	0	0.00	0.00
443	J-C2	J-C3	8.0	PVC	120.0	0	0.00	0.00
254	J-C2	J-P1	8.0	PVC	120.0	0	0.00	0.00
297	J-C4	J-C5	8.0	PVC	120.0	0	0.00	0.00
200	J-C6	R-2	12.0	PVC	120.0	0	0.00	0.00
331	J-C6	J-B5	12.0	PVC	120.0	0	0.00	0.00
527	J-C3	J-C4	8.0	PVC	120.0	0	0.00	0.00
296	J-C5	J-C6	8.0	PVC	120.0	0	0.00	0.00
442	J-P1	J-P2	8.0	PVC	120.0	0	0.00	0.00
262	J-P3	J-C4	8.0	PVC	120.0	0	0.00	0.00
258	J-P3	J-R2	8.0	PVC	120.0	0	0.00	0.00
333	J-P2	J-P3	8.0	PVC	120.0	0	0.00	0.00
406	J-C7	J-C8	8.0	PVC	120.0	0	0.00	0.00
207	J-C7	J-C1	8.0	PVC	120.0	0	0.00	0.00
287	J-C8	J-C9	8.0	PVC	120.0	0	0.00	0.00
388	J-C9	J-D1	8.0	PVC	120.0	0	0.00	0.00
361	J-D1	J-E1	8.0	PVC	120.0	0	0.00	0.00
493	J-E1	J-C8	8.0	PVC	120.0	0	0.00	0.00
265	J-E1	J-F1	8.0	PVC	120.0	0	0.00	0.00
351	J-F1	J-C7	8.0	PVC	120.0	0	0.00	0.00
309	J-F1	J-F2	8.0	PVC	120.0	0	0.00	0.00
290	J-E2	J-E1	8.0	PVC	120.0	0	0.00	0.00
293	J-F2	J-F3	8.0	PVC	120.0	0	0.00	0.00
265	J-F3	J-E3	8.0	PVC	120.0	0	0.00	0.00
312	J-E3	J-E2	8.0	PVC	120.0	0	0.00	0.00
503	J-R1	J-R2	8.0	PVC	120.0	0	0.00	0.00
333	J-R2	J-R3	8.0	PVC	120.0	0	0.00	0.00
201	J-R2	J-B3	8.0	PVC	120.0	0	0.00	0.00
288	J-R3	J-B5	8.0	PVC	120.0	0	0.00	0.00
344	J-B5	J-B4	12.0	PVC	120.0	0	0.00	0.00
268	J-B4	J-J1	8.0	PVC	120.0	0	0.00	0.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 100%

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
340	J-B4	J-B3	12.0	PVC	120.0	0	0.00	0.00
405	J-B3	J-B2	12.0	PVC	120.0	0	0.00	0.00
138	J-B2	J-B1	12.0	PVC	120.0	0	0.00	0.00
183	J-B2	J-R1	8.0	PVC	120.0	0	0.00	0.00
407	J-B1	J-H2	12.0	PVC	120.0	0	0.00	0.00
300	J-B1	J-F3	8.0	PVC	120.0	0	0.00	0.00
277	J-H2	J-H8	12.0	PVC	120.0	0	0.00	0.00
362	J-H2	J-H3	8.0	PVC	120.0	0	0.00	0.00
565	J-H1	J-H2	8.0	PVC	120.0	0	0.00	0.00
354	J-H9	J-H1	8.0	PVC	120.0	0	0.00	0.00
355	J-H8	J-M3	12.0	PVC	120.0	0	0.00	0.00
414	J-H8	J-H9	8.0	PVC	120.0	0	0.00	0.00
268	J-H7	J-H8	8.0	PVC	120.0	0	0.00	0.00
544	J-H6	J-H7	8.0	PVC	120.0	0	0.00	0.00
322	J-H5	J-H6	8.0	PVC	120.0	0	0.00	0.00
301	J-H4	J-H5	8.0	PVC	120.0	0	0.00	0.00
365	J-H3	J-H4	8.0	PVC	120.0	0	0.00	0.00
261	J-H3	J-H7	8.0	PVC	120.0	0	0.00	0.00
343	J-J1	J-L2	8.0	PVC	120.0	0	0.00	0.00
441	J-J1	J-J2	8.0	PVC	120.0	0	0.00	0.00
285	J-J1	J-H1	8.0	PVC	120.0	0	0.00	0.00
299	J-J2	J-M4	8.0	PVC	120.0	0	0.00	0.00
272	J-J2	J-L3	8.0	PVC	120.0	0	0.00	0.00
423	J-M4	J-M5	8.0	PVC	120.0	0	0.00	0.00
403	J-L3	J-L2	8.0	PVC	120.0	0	0.00	0.00
576	J-L2	J-L1	8.0	PVC	120.0	0	0.00	0.00
622	J-L1	J-C6	8.0	PVC	120.0	0	0.00	0.00
303	J-M5	J-M6	8.0	PVC	120.0	0	0.00	0.00
310	J-L5	J-M5	8.0	PVC	120.0	0	0.00	0.00
372	J-L5	J-L4	8.0	PVC	120.0	0	0.00	0.00
364	J-L4	J-L3	8.0	PVC	120.0	0	0.00	0.00
471	J-L6	J-L5	8.0	PVC	120.0	0	0.00	0.00
314	J-L7	J-L8	8.0	PVC	120.0	0	0.00	0.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 100%

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
514	J-L7	J-L6	8.0	PVC	120.0	0	0.00	0.00
282	J-M6	J-L7	8.0	PVC	120.0	0	0.00	0.00
286	J-L8	J-M1	8.0	PVC	120.0	0	0.00	0.00
318	J-L9	J-L8	8.0	PVC	120.0	0	0.00	0.00
276	J-L10	J-L9	8.0	PVC	120.0	0	0.00	0.00
374	J-M1	J-M2	8.0	PVC	120.0	0	0.00	0.00
843	J-M2	J-L10	8.0	PVC	120.0	0	0.00	0.00
186	J-M3	J-M2	8.0	PVC	120.0	0	0.00	0.00
530	J-M3	J-M4	8.0	PVC	120.0	0	0.00	0.00
127	J-C10	J-C9	8.0	PVC	120.0	0	0.00	0.00
112	J-E4	J-E3	8.0	PVC	120.0	0	0.00	0.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 20%

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,805.00	118
J-B2	6,533.99	0	6,805.00	117
J-B3	6,548.84	0	6,805.00	111
J-B4	6,557.42	0	6,805.00	107
J-B5	6,565.21	0	6,805.00	104
J-C1	6,544.27	0	6,805.00	113
J-C2	6,546.33	0	6,805.00	112
J-C3	6,553.21	0	6,805.00	109
J-C4	6,561.66	0	6,805.00	105
J-C5	6,566.37	0	6,805.00	103
J-C6	6,568.06	0	6,805.00	103
J-C7	6,543.80	0	6,805.00	113
J-C8	6,534.75	0	6,805.00	117
J-C9	6,528.49	0	6,805.00	120
J-C10	6,526.65	0	6,805.00	120
J-D1	6,522.51	0	6,805.00	122
J-E1	6,527.57	0	6,805.00	120
J-E2	6,523.59	0	6,805.00	122
J-E3	6,518.44	0	6,805.00	124
J-E4	6,514.86	0	6,805.00	126
J-F1	6,533.99	0	6,805.00	117
J-F2	6,529.69	0	6,805.00	119
J-F3	6,526.75	0	6,805.00	120
J-H1	6,545.49	0	6,805.00	112
J-H2	6,528.26	0	6,805.00	120
J-H3	6,523.79	0	6,805.00	122
J-H4	6,519.73	0	6,805.00	123
J-H5	6,516.12	0	6,805.00	125
J-H6	6,517.18	0	6,805.00	125
J-H7	6,524.06	0	6,805.00	122
J-H8	6,527.29	0	6,805.00	120
J-H9	6,536.51	0	6,805.00	116
J-J1	6,554.69	0	6,805.00	108
J-J2	6,546.94	0	6,805.00	112
J-L1	6,556.36	0	6,805.00	108
J-L2	6,548.78	0	6,805.00	111
J-L3	6,543.55	0	6,805.00	113
J-L4	6,538.83	0	6,805.00	115
J-L5	6,534.10	0	6,805.00	117
J-L6	6,528.03	0	6,805.00	120
J-L7	6,521.60	0	6,805.00	123
J-L8	6,517.62	0	6,805.00	124
J-L9	6,513.52	0	6,805.00	126
J-L10	6,510.06	0	6,805.00	128
J-M1	6,522.82	0	6,805.00	122
J-M2	6,530.94	0	6,805.00	119
J-M3	6,534.97	0	6,805.00	117
J-M4	6,542.86	0	6,805.00	113
J-M5	6,535.42	0	6,805.00	117

Bella Mesa North - WaterCAD Output Tables Static Conditions - 20%

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M6	6,527.96	0	6,805.00	120
J-P1	6,549.00	0	6,805.00	111
J-P2	6,554.43	0	6,805.00	108
J-P3	6,558.26	0	6,805.00	107
J-R1	6,545.43	0	6,805.00	112
J-R2	6,552.17	0	6,805.00	109
J-R3	6,559.94	0	6,805.00	106

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,805.00	0	6,805.00
R-2	6,805.00	0	6,805.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 20%

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	0	0.00	0.00
172	J-C1	J-C2	8.0	PVC	120.0	0	0.00	0.00
842	J-C1	J-B1	12.0	PVC	120.0	0	0.00	0.00
443	J-C2	J-C3	8.0	PVC	120.0	0	0.00	0.00
254	J-C2	J-P1	8.0	PVC	120.0	0	0.00	0.00
297	J-C4	J-C5	8.0	PVC	120.0	0	0.00	0.00
200	J-C6	R-2	12.0	PVC	120.0	0	0.00	0.00
331	J-C6	J-B5	12.0	PVC	120.0	0	0.00	0.00
527	J-C3	J-C4	8.0	PVC	120.0	0	0.00	0.00
296	J-C5	J-C6	8.0	PVC	120.0	0	0.00	0.00
442	J-P1	J-P2	8.0	PVC	120.0	0	0.00	0.00
262	J-P3	J-C4	8.0	PVC	120.0	0	0.00	0.00
258	J-P3	J-R2	8.0	PVC	120.0	0	0.00	0.00
333	J-P2	J-P3	8.0	PVC	120.0	0	0.00	0.00
406	J-C7	J-C8	8.0	PVC	120.0	0	0.00	0.00
207	J-C7	J-C1	8.0	PVC	120.0	0	0.00	0.00
287	J-C8	J-C9	8.0	PVC	120.0	0	0.00	0.00
388	J-C9	J-D1	8.0	PVC	120.0	0	0.00	0.00
361	J-D1	J-E1	8.0	PVC	120.0	0	0.00	0.00
493	J-E1	J-C8	8.0	PVC	120.0	0	0.00	0.00
265	J-E1	J-F1	8.0	PVC	120.0	0	0.00	0.00
351	J-F1	J-C7	8.0	PVC	120.0	0	0.00	0.00
309	J-F1	J-F2	8.0	PVC	120.0	0	0.00	0.00
290	J-E2	J-E1	8.0	PVC	120.0	0	0.00	0.00
293	J-F2	J-F3	8.0	PVC	120.0	0	0.00	0.00
265	J-F3	J-E3	8.0	PVC	120.0	0	0.00	0.00
312	J-E3	J-E2	8.0	PVC	120.0	0	0.00	0.00
503	J-R1	J-R2	8.0	PVC	120.0	0	0.00	0.00
333	J-R2	J-R3	8.0	PVC	120.0	0	0.00	0.00
201	J-R2	J-B3	8.0	PVC	120.0	0	0.00	0.00
288	J-R3	J-B5	8.0	PVC	120.0	0	0.00	0.00
344	J-B5	J-B4	12.0	PVC	120.0	0	0.00	0.00
268	J-B4	J-J1	8.0	PVC	120.0	0	0.00	0.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 20%

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
340	J-B4	J-B3	12.0	PVC	120.0	0	0.00	0.00
405	J-B3	J-B2	12.0	PVC	120.0	0	0.00	0.00
138	J-B2	J-B1	12.0	PVC	120.0	0	0.00	0.00
183	J-B2	J-R1	8.0	PVC	120.0	0	0.00	0.00
407	J-B1	J-H2	12.0	PVC	120.0	0	0.00	0.00
300	J-B1	J-F3	8.0	PVC	120.0	0	0.00	0.00
277	J-H2	J-H8	12.0	PVC	120.0	0	0.00	0.00
362	J-H2	J-H3	8.0	PVC	120.0	0	0.00	0.00
565	J-H1	J-H2	8.0	PVC	120.0	0	0.00	0.00
354	J-H9	J-H1	8.0	PVC	120.0	0	0.00	0.00
355	J-H8	J-M3	12.0	PVC	120.0	0	0.00	0.00
414	J-H8	J-H9	8.0	PVC	120.0	0	0.00	0.00
268	J-H7	J-H8	8.0	PVC	120.0	0	0.00	0.00
544	J-H6	J-H7	8.0	PVC	120.0	0	0.00	0.00
322	J-H5	J-H6	8.0	PVC	120.0	0	0.00	0.00
301	J-H4	J-H5	8.0	PVC	120.0	0	0.00	0.00
365	J-H3	J-H4	8.0	PVC	120.0	0	0.00	0.00
261	J-H3	J-H7	8.0	PVC	120.0	0	0.00	0.00
343	J-J1	J-L2	8.0	PVC	120.0	0	0.00	0.00
441	J-J1	J-J2	8.0	PVC	120.0	0	0.00	0.00
285	J-J1	J-H1	8.0	PVC	120.0	0	0.00	0.00
299	J-J2	J-M4	8.0	PVC	120.0	0	0.00	0.00
272	J-J2	J-L3	8.0	PVC	120.0	0	0.00	0.00
423	J-M4	J-M5	8.0	PVC	120.0	0	0.00	0.00
403	J-L3	J-L2	8.0	PVC	120.0	0	0.00	0.00
576	J-L2	J-L1	8.0	PVC	120.0	0	0.00	0.00
622	J-L1	J-C6	8.0	PVC	120.0	0	0.00	0.00
303	J-M5	J-M6	8.0	PVC	120.0	0	0.00	0.00
310	J-L5	J-M5	8.0	PVC	120.0	0	0.00	0.00
372	J-L5	J-L4	8.0	PVC	120.0	0	0.00	0.00
364	J-L4	J-L3	8.0	PVC	120.0	0	0.00	0.00
471	J-L6	J-L5	8.0	PVC	120.0	0	0.00	0.00
314	J-L7	J-L8	8.0	PVC	120.0	0	0.00	0.00

Bella Mesa North - WaterCAD Output Tables

Static Conditions - 20%

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
514	J-L7	J-L6	8.0	PVC	120.0	0	0.00	0.00
282	J-M6	J-L7	8.0	PVC	120.0	0	0.00	0.00
286	J-L8	J-M1	8.0	PVC	120.0	0	0.00	0.00
318	J-L9	J-L8	8.0	PVC	120.0	0	0.00	0.00
276	J-L10	J-L9	8.0	PVC	120.0	0	0.00	0.00
374	J-M1	J-M2	8.0	PVC	120.0	0	0.00	0.00
843	J-M2	J-L10	8.0	PVC	120.0	0	0.00	0.00
186	J-M3	J-M2	8.0	PVC	120.0	0	0.00	0.00
530	J-M3	J-M4	8.0	PVC	120.0	0	0.00	0.00
127	J-C10	J-C9	8.0	PVC	120.0	0	0.00	0.00
112	J-E4	J-E3	8.0	PVC	120.0	0	0.00	0.00

Bella Mesa North - WaterCAD Output Tables

Average Day Conditions

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,804.99	118
J-B2	6,533.99	0	6,804.99	117
J-B3	6,548.84	0	6,804.99	111
J-B4	6,557.42	0	6,804.99	107
J-B5	6,565.21	0	6,804.99	104
J-C1	6,544.27	0	6,804.99	113
J-C2	6,546.33	3	6,804.99	112
J-C3	6,553.21	7	6,804.99	109
J-C4	6,561.66	3	6,804.99	105
J-C5	6,566.37	4	6,804.99	103
J-C6	6,568.06	1	6,805.00	103
J-C7	6,543.80	4	6,804.99	113
J-C8	6,534.75	4	6,804.99	117
J-C9	6,528.49	4	6,804.99	120
J-C10	6,526.65	2	6,804.99	120
J-D1	6,522.51	3	6,804.99	122
J-E1	6,527.57	3	6,804.99	120
J-E2	6,523.59	3	6,804.99	122
J-E3	6,518.44	3	6,804.99	124
J-E4	6,514.86	1	6,804.99	126
J-F1	6,533.99	3	6,804.99	117
J-F2	6,529.69	4	6,804.99	119
J-F3	6,526.75	2	6,804.99	120
J-H1	6,545.49	4	6,804.98	112
J-H2	6,528.26	3	6,804.98	120
J-H3	6,523.79	3	6,804.98	122
J-H4	6,519.73	3	6,804.98	123
J-H5	6,516.12	3	6,804.98	125
J-H6	6,517.18	4	6,804.98	125
J-H7	6,524.06	3	6,804.98	122
J-H8	6,527.29	3	6,804.98	120
J-H9	6,536.51	5	6,804.98	116
J-J1	6,554.69	3	6,804.98	108
J-J2	6,546.94	3	6,804.98	112
J-L1	6,556.36	4	6,804.99	108
J-L2	6,548.78	4	6,804.98	111
J-L3	6,543.55	3	6,804.98	113
J-L4	6,538.83	4	6,804.98	115
J-L5	6,534.10	3	6,804.98	117
J-L6	6,528.03	4	6,804.98	120
J-L7	6,521.60	3	6,804.98	123
J-L8	6,517.62	2	6,804.98	124
J-L9	6,513.52	3	6,804.98	126
J-L10	6,510.06	2	6,804.98	128
J-M1	6,522.82	3	6,804.98	122
J-M2	6,530.94	2	6,804.98	119
J-M3	6,534.97	2	6,804.98	117
J-M4	6,542.86	3	6,804.98	113
J-M5	6,535.42	3	6,804.98	117

Bella Mesa North - WaterCAD Output Tables

Average Day Conditions

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M6	6,527.96	4	6,804.98	120
J-P1	6,549.00	2	6,804.99	111
J-P2	6,554.43	4	6,804.99	108
J-P3	6,558.26	2	6,804.99	107
J-R1	6,545.43	3	6,804.99	112
J-R2	6,552.17	2	6,804.99	109
J-R3	6,559.94	3	6,804.99	106

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,805.00	72	6,805.00
R-2	6,805.00	77	6,805.00

Bella Mesa North - WaterCAD Output Tables

Average Day Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	72	0.20	0.01
172	J-C1	J-C2	8.0	PVC	120.0	15	0.10	0.00
842	J-C1	J-B1	12.0	PVC	120.0	33	0.09	0.00
443	J-C2	J-C3	8.0	PVC	120.0	5	0.03	0.00
254	J-C2	J-P1	8.0	PVC	120.0	7	0.05	0.00
297	J-C4	J-C5	8.0	PVC	120.0	-11	0.07	0.00
200	J-C6	R-2	12.0	PVC	120.0	-77	0.22	0.00
331	J-C6	J-B5	12.0	PVC	120.0	45	0.13	0.00
527	J-C3	J-C4	8.0	PVC	120.0	-1	0.01	0.00
296	J-C5	J-C6	8.0	PVC	120.0	-15	0.10	0.00
442	J-P1	J-P2	8.0	PVC	120.0	5	0.03	0.00
262	J-P3	J-C4	8.0	PVC	120.0	-7	0.05	0.00
258	J-P3	J-R2	8.0	PVC	120.0	6	0.04	0.00
333	J-P2	J-P3	8.0	PVC	120.0	1	0.01	0.00
406	J-C7	J-C8	8.0	PVC	120.0	10	0.07	0.00
207	J-C7	J-C1	8.0	PVC	120.0	-24	0.15	0.00
287	J-C8	J-C9	8.0	PVC	120.0	5	0.03	0.00
388	J-C9	J-D1	8.0	PVC	120.0	-1	0.01	0.00
361	J-D1	J-E1	8.0	PVC	120.0	-3	0.02	0.00
493	J-E1	J-C8	8.0	PVC	120.0	-2	0.01	0.00
265	J-E1	J-F1	8.0	PVC	120.0	-6	0.04	0.00
351	J-F1	J-C7	8.0	PVC	120.0	-10	0.06	0.00
309	J-F1	J-F2	8.0	PVC	120.0	2	0.01	0.00
290	J-E2	J-E1	8.0	PVC	120.0	-2	0.01	0.00
293	J-F2	J-F3	8.0	PVC	120.0	-2	0.01	0.00
265	J-F3	J-E3	8.0	PVC	120.0	6	0.04	0.00
312	J-E3	J-E2	8.0	PVC	120.0	1	0.01	0.00
503	J-R1	J-R2	8.0	PVC	120.0	-6	0.04	0.00
333	J-R2	J-R3	8.0	PVC	120.0	-7	0.05	0.00
201	J-R2	J-B3	8.0	PVC	120.0	5	0.03	0.00
288	J-R3	J-B5	8.0	PVC	120.0	-10	0.07	0.00
344	J-B5	J-B4	12.0	PVC	120.0	35	0.10	0.00
268	J-B4	J-J1	8.0	PVC	120.0	22	0.14	0.00

Bella Mesa North - WaterCAD Output Tables

Average Day Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
340	J-B4	J-B3	12.0	PVC	120.0	13	0.04	0.00
405	J-B3	J-B2	12.0	PVC	120.0	18	0.05	0.00
138	J-B2	J-B1	12.0	PVC	120.0	21	0.06	0.00
183	J-B2	J-R1	8.0	PVC	120.0	-3	0.02	0.00
407	J-B1	J-H2	12.0	PVC	120.0	43	0.12	0.00
300	J-B1	J-F3	8.0	PVC	120.0	10	0.07	0.00
277	J-H2	J-H8	12.0	PVC	120.0	27	0.08	0.00
362	J-H2	J-H3	8.0	PVC	120.0	10	0.06	0.00
565	J-H1	J-H2	8.0	PVC	120.0	-4	0.02	0.00
354	J-H9	J-H1	8.0	PVC	120.0	-6	0.04	0.00
355	J-H8	J-M3	12.0	PVC	120.0	20	0.06	0.00
414	J-H8	J-H9	8.0	PVC	120.0	-1	0.01	0.00
268	J-H7	J-H8	8.0	PVC	120.0	-6	0.04	0.00
544	J-H6	J-H7	8.0	PVC	120.0	-4	0.03	0.00
322	J-H5	J-H6	8.0	PVC	120.0	0	0.00	0.00
301	J-H4	J-H5	8.0	PVC	120.0	2	0.02	0.00
365	J-H3	J-H4	8.0	PVC	120.0	5	0.03	0.00
261	J-H3	J-H7	8.0	PVC	120.0	2	0.01	0.00
343	J-J1	J-L2	8.0	PVC	120.0	2	0.01	0.00
441	J-J1	J-J2	8.0	PVC	120.0	10	0.07	0.00
285	J-J1	J-H1	8.0	PVC	120.0	6	0.04	0.00
299	J-J2	J-M4	8.0	PVC	120.0	6	0.04	0.00
272	J-J2	J-L3	8.0	PVC	120.0	1	0.01	0.00
423	J-M4	J-M5	8.0	PVC	120.0	8	0.05	0.00
403	J-L3	J-L2	8.0	PVC	120.0	-11	0.07	0.00
576	J-L2	J-L1	8.0	PVC	120.0	-13	0.08	0.00
622	J-L1	J-C6	8.0	PVC	120.0	-16	0.10	0.01
303	J-M5	J-M6	8.0	PVC	120.0	5	0.03	0.00
310	J-L5	J-M5	8.0	PVC	120.0	-1	0.01	0.00
372	J-L5	J-L4	8.0	PVC	120.0	-5	0.03	0.00
364	J-L4	J-L3	8.0	PVC	120.0	-9	0.06	0.00
471	J-L6	J-L5	8.0	PVC	120.0	-4	0.02	0.00
314	J-L7	J-L8	8.0	PVC	120.0	-1	0.01	0.00

Bella Mesa North - WaterCAD Output Tables

Average Day Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
514	J-L7	J-L6	8.0	PVC	120.0	0	0.00	0.00
282	J-M6	J-L7	8.0	PVC	120.0	1	0.01	0.00
286	J-L8	J-M1	8.0	PVC	120.0	-4	0.02	0.00
318	J-L9	J-L8	8.0	PVC	120.0	0	0.00	0.00
276	J-L10	J-L9	8.0	PVC	120.0	2	0.02	0.00
374	J-M1	J-M2	8.0	PVC	120.0	-6	0.04	0.00
843	J-M2	J-L10	8.0	PVC	120.0	4	0.03	0.00
186	J-M3	J-M2	8.0	PVC	120.0	13	0.08	0.00
530	J-M3	J-M4	8.0	PVC	120.0	5	0.03	0.00
127	J-C10	J-C9	8.0	PVC	120.0	-2	0.01	0.00
112	J-E4	J-E3	8.0	PVC	120.0	-1	0.01	0.00

Bella Mesa North - WaterCAD Output Tables

Max Day Conditions

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,804.94	118
J-B2	6,533.99	0	6,804.94	117
J-B3	6,548.84	0	6,804.94	111
J-B4	6,557.42	0	6,804.94	107
J-B5	6,565.21	0	6,804.96	104
J-C1	6,544.27	0	6,804.96	113
J-C2	6,546.33	6	6,804.95	112
J-C3	6,553.21	17	6,804.95	109
J-C4	6,561.66	6	6,804.95	105
J-C5	6,566.37	10	6,804.96	103
J-C6	6,568.06	1	6,804.97	103
J-C7	6,543.80	9	6,804.94	113
J-C8	6,534.75	9	6,804.93	117
J-C9	6,528.49	10	6,804.93	120
J-C10	6,526.65	4	6,804.93	120
J-D1	6,522.51	6	6,804.93	122
J-E1	6,527.57	7	6,804.93	120
J-E2	6,523.59	8	6,804.93	122
J-E3	6,518.44	8	6,804.93	124
J-E4	6,514.86	3	6,804.93	125
J-F1	6,533.99	6	6,804.93	117
J-F2	6,529.69	9	6,804.93	119
J-F3	6,526.75	6	6,804.93	120
J-H1	6,545.49	10	6,804.92	112
J-H2	6,528.26	7	6,804.92	120
J-H3	6,523.79	7	6,804.91	122
J-H4	6,519.73	7	6,804.91	123
J-H5	6,516.12	7	6,804.91	125
J-H6	6,517.18	10	6,804.91	124
J-H7	6,524.06	8	6,804.91	122
J-H8	6,527.29	6	6,804.91	120
J-H9	6,536.51	12	6,804.91	116
J-J1	6,554.69	8	6,804.92	108
J-J2	6,546.94	8	6,804.91	112
J-L1	6,556.36	9	6,804.94	108
J-L2	6,548.78	9	6,804.92	111
J-L3	6,543.55	8	6,804.91	113
J-L4	6,538.83	9	6,804.90	115
J-L5	6,534.10	6	6,804.90	117
J-L6	6,528.03	9	6,804.90	120
J-L7	6,521.60	6	6,804.90	123
J-L8	6,517.62	5	6,804.90	124
J-L9	6,513.52	7	6,804.90	126
J-L10	6,510.06	5	6,804.90	128
J-M1	6,522.82	7	6,804.90	122
J-M2	6,530.94	6	6,804.90	119
J-M3	6,534.97	5	6,804.91	117
J-M4	6,542.86	8	6,804.90	113
J-M5	6,535.42	6	6,804.90	117

Bella Mesa North - WaterCAD Output Tables Max Day Conditions

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M6	6,527.96	9	6,804.90	120
J-P1	6,549.00	6	6,804.95	111
J-P2	6,554.43	10	6,804.95	108
J-P3	6,558.26	6	6,804.95	107
J-R1	6,545.43	8	6,804.94	112
J-R2	6,552.17	6	6,804.94	109
J-R3	6,559.94	7	6,804.95	106

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,805.00	181	6,805.00
R-2	6,805.00	192	6,805.00

Bella Mesa North - WaterCAD Output Tables

Max Day Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	181	0.51	0.04
172	J-C1	J-C2	8.0	PVC	120.0	38	0.24	0.01
842	J-C1	J-B1	12.0	PVC	120.0	82	0.23	0.02
443	J-C2	J-C3	8.0	PVC	120.0	14	0.09	0.00
254	J-C2	J-P1	8.0	PVC	120.0	18	0.12	0.00
297	J-C4	J-C5	8.0	PVC	120.0	-28	0.18	0.01
200	J-C6	R-2	12.0	PVC	120.0	-192	0.54	0.03
331	J-C6	J-B5	12.0	PVC	120.0	112	0.32	0.02
527	J-C3	J-C4	8.0	PVC	120.0	-3	0.02	0.00
296	J-C5	J-C6	8.0	PVC	120.0	-37	0.24	0.01
442	J-P1	J-P2	8.0	PVC	120.0	13	0.08	0.00
262	J-P3	J-C4	8.0	PVC	120.0	-18	0.12	0.00
258	J-P3	J-R2	8.0	PVC	120.0	15	0.10	0.00
333	J-P2	J-P3	8.0	PVC	120.0	3	0.02	0.00
406	J-C7	J-C8	8.0	PVC	120.0	26	0.17	0.01
207	J-C7	J-C1	8.0	PVC	120.0	-60	0.38	0.02
287	J-C8	J-C9	8.0	PVC	120.0	12	0.08	0.00
388	J-C9	J-D1	8.0	PVC	120.0	-2	0.02	0.00
361	J-D1	J-E1	8.0	PVC	120.0	-9	0.05	0.00
493	J-E1	J-C8	8.0	PVC	120.0	-5	0.03	0.00
265	J-E1	J-F1	8.0	PVC	120.0	-15	0.10	0.00
351	J-F1	J-C7	8.0	PVC	120.0	-25	0.16	0.01
309	J-F1	J-F2	8.0	PVC	120.0	4	0.02	0.00
290	J-E2	J-E1	8.0	PVC	120.0	-4	0.03	0.00
293	J-F2	J-F3	8.0	PVC	120.0	-5	0.03	0.00
265	J-F3	J-E3	8.0	PVC	120.0	15	0.10	0.00
312	J-E3	J-E2	8.0	PVC	120.0	4	0.02	0.00
503	J-R1	J-R2	8.0	PVC	120.0	-16	0.10	0.00
333	J-R2	J-R3	8.0	PVC	120.0	-19	0.12	0.00
201	J-R2	J-B3	8.0	PVC	120.0	13	0.08	0.00
288	J-R3	J-B5	8.0	PVC	120.0	-26	0.16	0.01
344	J-B5	J-B4	12.0	PVC	120.0	87	0.25	0.01
268	J-B4	J-J1	8.0	PVC	120.0	55	0.35	0.03

Bella Mesa North - WaterCAD Output Tables
Max Day Conditions
FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
340	J-B4	J-B3	12.0	PVC	120.0	32	0.09	0.00
405	J-B3	J-B2	12.0	PVC	120.0	45	0.13	0.00
138	J-B2	J-B1	12.0	PVC	120.0	52	0.15	0.00
183	J-B2	J-R1	8.0	PVC	120.0	-7	0.05	0.00
407	J-B1	J-H2	12.0	PVC	120.0	108	0.31	0.02
300	J-B1	J-F3	8.0	PVC	120.0	26	0.17	0.01
277	J-H2	J-H8	12.0	PVC	120.0	68	0.19	0.01
362	J-H2	J-H3	8.0	PVC	120.0	24	0.15	0.01
565	J-H1	J-H2	8.0	PVC	120.0	-9	0.06	0.00
354	J-H9	J-H1	8.0	PVC	120.0	-15	0.10	0.00
355	J-H8	J-M3	12.0	PVC	120.0	50	0.14	0.00
414	J-H8	J-H9	8.0	PVC	120.0	-3	0.02	0.00
268	J-H7	J-H8	8.0	PVC	120.0	-15	0.10	0.00
544	J-H6	J-H7	8.0	PVC	120.0	-11	0.07	0.00
322	J-H5	J-H6	8.0	PVC	120.0	-1	0.00	0.00
301	J-H4	J-H5	8.0	PVC	120.0	6	0.04	0.00
365	J-H3	J-H4	8.0	PVC	120.0	13	0.08	0.00
261	J-H3	J-H7	8.0	PVC	120.0	4	0.03	0.00
343	J-J1	J-L2	8.0	PVC	120.0	5	0.03	0.00
441	J-J1	J-J2	8.0	PVC	120.0	26	0.17	0.01
285	J-J1	J-H1	8.0	PVC	120.0	16	0.10	0.00
299	J-J2	J-M4	8.0	PVC	120.0	15	0.10	0.00
272	J-J2	J-L3	8.0	PVC	120.0	3	0.02	0.00
423	J-M4	J-M5	8.0	PVC	120.0	20	0.13	0.01
403	J-L3	J-L2	8.0	PVC	120.0	-27	0.17	0.01
576	J-L2	J-L1	8.0	PVC	120.0	-31	0.20	0.02
622	J-L1	J-C6	8.0	PVC	120.0	-40	0.26	0.03
303	J-M5	J-M6	8.0	PVC	120.0	12	0.07	0.00
310	J-L5	J-M5	8.0	PVC	120.0	-2	0.01	0.00
372	J-L5	J-L4	8.0	PVC	120.0	-13	0.08	0.00
364	J-L4	J-L3	8.0	PVC	120.0	-22	0.14	0.01
471	J-L6	J-L5	8.0	PVC	120.0	-9	0.06	0.00
314	J-L7	J-L8	8.0	PVC	120.0	-3	0.02	0.00

Bella Mesa North - WaterCAD Output Tables

Max Day Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
514	J-L7	J-L6	8.0	PVC	120.0	0	0.00	0.00
282	J-M6	J-L7	8.0	PVC	120.0	3	0.02	0.00
286	J-L8	J-M1	8.0	PVC	120.0	-9	0.06	0.00
318	J-L9	J-L8	8.0	PVC	120.0	-1	0.01	0.00
276	J-L10	J-L9	8.0	PVC	120.0	6	0.04	0.00
374	J-M1	J-M2	8.0	PVC	120.0	-16	0.10	0.00
843	J-M2	J-L10	8.0	PVC	120.0	11	0.07	0.00
186	J-M3	J-M2	8.0	PVC	120.0	32	0.21	0.01
530	J-M3	J-M4	8.0	PVC	120.0	13	0.08	0.00
127	J-C10	J-C9	8.0	PVC	120.0	-4	0.03	0.00
112	J-E4	J-E3	8.0	PVC	120.0	-3	0.02	0.00

Bella Mesa North - WaterCAD Output Tables

Peak Hour Conditions

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,804.73	118
J-B2	6,533.99	0	6,804.74	117
J-B3	6,548.84	0	6,804.75	111
J-B4	6,557.42	0	6,804.76	107
J-B5	6,565.21	0	6,804.81	104
J-C1	6,544.27	0	6,804.83	113
J-C2	6,546.33	14	6,804.80	112
J-C3	6,553.21	37	6,804.78	109
J-C4	6,561.66	14	6,804.78	105
J-C5	6,566.37	21	6,804.82	103
J-C6	6,568.06	3	6,804.88	102
J-C7	6,543.80	20	6,804.73	113
J-C8	6,534.75	20	6,804.69	117
J-C9	6,528.49	23	6,804.68	119
J-C10	6,526.65	9	6,804.68	120
J-D1	6,522.51	14	6,804.68	122
J-E1	6,527.57	15	6,804.69	120
J-E2	6,523.59	17	6,804.69	122
J-E3	6,518.44	18	6,804.69	124
J-E4	6,514.86	8	6,804.69	125
J-F1	6,533.99	14	6,804.70	117
J-F2	6,529.69	20	6,804.70	119
J-F3	6,526.75	12	6,804.70	120
J-H1	6,545.49	21	6,804.64	112
J-H2	6,528.26	15	6,804.65	120
J-H3	6,523.79	15	6,804.61	121
J-H4	6,519.73	15	6,804.60	123
J-H5	6,516.12	15	6,804.60	125
J-H6	6,517.18	23	6,804.60	124
J-H7	6,524.06	18	6,804.61	121
J-H8	6,527.29	14	6,804.62	120
J-H9	6,536.51	26	6,804.62	116
J-J1	6,554.69	18	6,804.65	108
J-J2	6,546.94	17	6,804.60	111
J-L1	6,556.36	20	6,804.73	107
J-L2	6,548.78	20	6,804.65	111
J-L3	6,543.55	17	6,804.60	113
J-L4	6,538.83	20	6,804.57	115
J-L5	6,534.10	14	6,804.56	117
J-L6	6,528.03	20	6,804.55	120
J-L7	6,521.60	14	6,804.55	122
J-L8	6,517.62	11	6,804.55	124
J-L9	6,513.52	15	6,804.55	126
J-L10	6,510.06	11	6,804.56	127
J-M1	6,522.82	15	6,804.56	122
J-M2	6,530.94	12	6,804.57	118
J-M3	6,534.97	11	6,804.60	117
J-M4	6,542.86	17	6,804.59	113
J-M5	6,535.42	14	6,804.56	116

Bella Mesa North - WaterCAD Output Tables Peak Hour Conditions

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M6	6,527.96	20	6,804.55	120
J-P1	6,549.00	12	6,804.78	111
J-P2	6,554.43	23	6,804.77	108
J-P3	6,558.26	12	6,804.77	107
J-R1	6,545.43	18	6,804.74	112
J-R2	6,552.17	12	6,804.76	109
J-R3	6,559.94	15	6,804.78	106

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,805.00	397	6,805.00
R-2	6,805.00	422	6,805.00

Bella Mesa North - WaterCAD Output Tables

Peak Hour Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	397	1.13	0.17
172	J-C1	J-C2	8.0	PVC	120.0	84	0.54	0.04
842	J-C1	J-B1	12.0	PVC	120.0	181	0.51	0.10
443	J-C2	J-C3	8.0	PVC	120.0	30	0.19	0.01
254	J-C2	J-P1	8.0	PVC	120.0	41	0.26	0.01
297	J-C4	J-C5	8.0	PVC	120.0	-61	0.39	0.04
200	J-C6	R-2	12.0	PVC	120.0	-422	1.20	0.12
331	J-C6	J-B5	12.0	PVC	120.0	247	0.70	0.07
527	J-C3	J-C4	8.0	PVC	120.0	-7	0.04	0.00
296	J-C5	J-C6	8.0	PVC	120.0	-82	0.53	0.06
442	J-P1	J-P2	8.0	PVC	120.0	28	0.18	0.01
262	J-P3	J-C4	8.0	PVC	120.0	-40	0.26	0.01
258	J-P3	J-R2	8.0	PVC	120.0	34	0.22	0.01
333	J-P2	J-P3	8.0	PVC	120.0	6	0.04	0.00
406	J-C7	J-C8	8.0	PVC	120.0	57	0.36	0.04
207	J-C7	J-C1	8.0	PVC	120.0	-132	0.84	0.10
287	J-C8	J-C9	8.0	PVC	120.0	27	0.17	0.01
388	J-C9	J-D1	8.0	PVC	120.0	-5	0.03	0.00
361	J-D1	J-E1	8.0	PVC	120.0	-19	0.12	0.00
493	J-E1	J-C8	8.0	PVC	120.0	-10	0.06	0.00
265	J-E1	J-F1	8.0	PVC	120.0	-33	0.21	0.01
351	J-F1	J-C7	8.0	PVC	120.0	-55	0.35	0.03
309	J-F1	J-F2	8.0	PVC	120.0	8	0.05	0.00
290	J-E2	J-E1	8.0	PVC	120.0	-9	0.06	0.00
293	J-F2	J-F3	8.0	PVC	120.0	-11	0.07	0.00
265	J-F3	J-E3	8.0	PVC	120.0	34	0.22	0.01
312	J-E3	J-E2	8.0	PVC	120.0	8	0.05	0.00
503	J-R1	J-R2	8.0	PVC	120.0	-34	0.22	0.02
333	J-R2	J-R3	8.0	PVC	120.0	-41	0.26	0.02
201	J-R2	J-B3	8.0	PVC	120.0	28	0.18	0.01
288	J-R3	J-B5	8.0	PVC	120.0	-56	0.36	0.03
344	J-B5	J-B4	12.0	PVC	120.0	191	0.54	0.05
268	J-B4	J-J1	8.0	PVC	120.0	120	0.77	0.11

Bella Mesa North - WaterCAD Output Tables

Peak Hour Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
340	J-B4	J-B3	12.0	PVC	120.0	71	0.20	0.01
405	J-B3	J-B2	12.0	PVC	120.0	99	0.28	0.02
138	J-B2	J-B1	12.0	PVC	120.0	115	0.33	0.01
183	J-B2	J-R1	8.0	PVC	120.0	-16	0.10	0.00
407	J-B1	J-H2	12.0	PVC	120.0	239	0.68	0.08
300	J-B1	J-F3	8.0	PVC	120.0	58	0.37	0.03
277	J-H2	J-H8	12.0	PVC	120.0	149	0.42	0.02
362	J-H2	J-H3	8.0	PVC	120.0	53	0.34	0.03
565	J-H1	J-H2	8.0	PVC	120.0	-21	0.13	0.01
354	J-H9	J-H1	8.0	PVC	120.0	-34	0.21	0.01
355	J-H8	J-M3	12.0	PVC	120.0	110	0.31	0.02
414	J-H8	J-H9	8.0	PVC	120.0	-8	0.05	0.00
268	J-H7	J-H8	8.0	PVC	120.0	-34	0.22	0.01
544	J-H6	J-H7	8.0	PVC	120.0	-25	0.16	0.01
322	J-H5	J-H6	8.0	PVC	120.0	-2	0.01	0.00
301	J-H4	J-H5	8.0	PVC	120.0	14	0.09	0.00
365	J-H3	J-H4	8.0	PVC	120.0	29	0.18	0.01
261	J-H3	J-H7	8.0	PVC	120.0	9	0.06	0.00
343	J-J1	J-L2	8.0	PVC	120.0	10	0.07	0.00
441	J-J1	J-J2	8.0	PVC	120.0	57	0.37	0.05
285	J-J1	J-H1	8.0	PVC	120.0	34	0.22	0.01
299	J-J2	J-M4	8.0	PVC	120.0	34	0.22	0.01
272	J-J2	J-L3	8.0	PVC	120.0	6	0.04	0.00
423	J-M4	J-M5	8.0	PVC	120.0	45	0.28	0.03
403	J-L3	J-L2	8.0	PVC	120.0	-59	0.38	0.05
576	J-L2	J-L1	8.0	PVC	120.0	-69	0.44	0.09
622	J-L1	J-C6	8.0	PVC	120.0	-89	0.57	0.15
303	J-M5	J-M6	8.0	PVC	120.0	26	0.16	0.01
310	J-L5	J-M5	8.0	PVC	120.0	-5	0.03	0.00
372	J-L5	J-L4	8.0	PVC	120.0	-29	0.19	0.01
364	J-L4	J-L3	8.0	PVC	120.0	-49	0.31	0.03
471	J-L6	J-L5	8.0	PVC	120.0	-20	0.13	0.01
314	J-L7	J-L8	8.0	PVC	120.0	-7	0.05	0.00

Bella Mesa North - WaterCAD Output Tables

Peak Hour Conditions

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
514	J-L7	J-L6	8.0	PVC	120.0	-1	0.00	0.00
282	J-M6	J-L7	8.0	PVC	120.0	6	0.04	0.00
286	J-L8	J-M1	8.0	PVC	120.0	-20	0.13	0.00
318	J-L9	J-L8	8.0	PVC	120.0	-2	0.01	0.00
276	J-L10	J-L9	8.0	PVC	120.0	14	0.09	0.00
374	J-M1	J-M2	8.0	PVC	120.0	-35	0.22	0.02
843	J-M2	J-L10	8.0	PVC	120.0	24	0.15	0.02
186	J-M3	J-M2	8.0	PVC	120.0	71	0.46	0.03
530	J-M3	J-M4	8.0	PVC	120.0	28	0.18	0.01
127	J-C10	J-C9	8.0	PVC	120.0	-9	0.06	0.00
112	J-E4	J-E3	8.0	PVC	120.0	-8	0.05	0.00

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - C5

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,800.06	116
J-B2	6,533.99	0	6,799.84	115
J-B3	6,548.84	0	6,799.45	108
J-B4	6,557.42	0	6,799.27	105
J-B5	6,565.21	0	6,798.98	101
J-C1	6,544.27	0	6,802.11	112
J-C2	6,546.33	6	6,800.70	110
J-C3	6,553.21	17	6,799.43	107
J-C4	6,561.66	6	6,798.06	102
J-C5 (FF APPLIED)	6,566.37	1,500	6,794.62	99
J-C6	6,568.06	1	6,798.56	100
J-C7	6,543.80	9	6,801.45	111
J-C8	6,534.75	9	6,801.17	115
J-C9	6,528.49	10	6,801.13	118
J-C10	6,526.65	4	6,801.13	119
J-D1	6,522.51	6	6,801.10	121
J-E1	6,527.57	7	6,801.08	118
J-E2	6,523.59	8	6,800.91	120
J-E3	6,518.44	8	6,800.75	122
J-E4	6,514.86	3	6,800.75	124
J-F1	6,533.99	6	6,801.08	116
J-F2	6,529.69	9	6,800.84	117
J-F3	6,526.75	6	6,800.64	118
J-H1	6,545.49	10	6,799.58	110
J-H2	6,528.26	7	6,799.78	117
J-H3	6,523.79	7	6,799.73	119
J-H4	6,519.73	7	6,799.72	121
J-H5	6,516.12	7	6,799.71	123
J-H6	6,517.18	10	6,799.71	122
J-H7	6,524.06	8	6,799.71	119
J-H8	6,527.29	6	6,799.70	118
J-H9	6,536.51	12	6,799.63	114
J-J1	6,554.69	8	6,799.37	106
J-J2	6,546.94	8	6,799.39	109
J-L1	6,556.36	9	6,798.92	105
J-L2	6,548.78	9	6,799.29	108
J-L3	6,543.55	8	6,799.37	111
J-L4	6,538.83	9	6,799.40	113
J-L5	6,534.10	6	6,799.43	115
J-L6	6,528.03	9	6,799.44	117
J-L7	6,521.60	6	6,799.47	120
J-L8	6,517.62	5	6,799.52	122
J-L9	6,513.52	7	6,799.53	124
J-L10	6,510.06	5	6,799.54	125
J-M1	6,522.82	7	6,799.54	120
J-M2	6,530.94	6	6,799.58	116
J-M3	6,534.97	5	6,799.64	115
J-M4	6,542.86	8	6,799.45	111

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - C5

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M5	6,535.42	6	6,799.45	114
J-M6	6,527.96	9	6,799.45	117
J-P1	6,549.00	6	6,800.29	109
J-P2	6,554.43	10	6,799.58	106
J-P3	6,558.26	6	6,799.10	104
J-R1	6,545.43	8	6,799.69	110
J-R2	6,552.17	6	6,799.31	107
J-R3	6,559.94	7	6,799.13	103

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,805.00	1,863	6,805.00
R-2	6,805.00	0	6,805.00

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - C5

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	1,863	5.28	2.89
172	J-C1	J-C2	8.0	PVC	120.0	598	3.82	1.41
842	J-C1	J-B1	12.0	PVC	120.0	904	2.56	2.05
443	J-C2	J-C3	8.0	PVC	120.0	340	2.17	1.27
254	J-C2	J-P1	8.0	PVC	120.0	252	1.61	0.42
297	J-C4	J-C5 (FF APPLIED)	8.0	PVC	120.0	722	4.61	3.44
200	J-C6	R-2	12.0	PVC	120.0	0	0.00	0.00
331	J-C6	J-B5	12.0	PVC	120.0	-637	1.81	0.42
527	J-C3	J-C4	8.0	PVC	120.0	323	2.06	1.38
296	J-C5 (FF APPLIED)	J-C6	8.0	PVC	120.0	-778	4.97	3.94
442	J-P1	J-P2	8.0	PVC	120.0	247	1.57	0.70
262	J-P3	J-C4	8.0	PVC	120.0	405	2.58	1.04
258	J-P3	J-R2	8.0	PVC	120.0	-174	1.11	0.21
333	J-P2	J-P3	8.0	PVC	120.0	236	1.51	0.49
406	J-C7	J-C8	8.0	PVC	120.0	155	0.99	0.27
207	J-C7	J-C1	8.0	PVC	120.0	-361	2.30	0.66
287	J-C8	J-C9	8.0	PVC	120.0	66	0.42	0.04
388	J-C9	J-D1	8.0	PVC	120.0	51	0.33	0.03
361	J-D1	J-E1	8.0	PVC	120.0	45	0.29	0.02
493	J-E1	J-C8	8.0	PVC	120.0	-80	0.51	0.10
265	J-E1	J-F1	8.0	PVC	120.0	-23	0.15	0.01
351	J-F1	J-C7	8.0	PVC	120.0	-196	1.25	0.37
309	J-F1	J-F2	8.0	PVC	120.0	167	1.07	0.24
290	J-E2	J-E1	8.0	PVC	120.0	-141	0.90	0.16
293	J-F2	J-F3	8.0	PVC	120.0	158	1.01	0.20
265	J-F3	J-E3	8.0	PVC	120.0	-122	0.78	0.11
312	J-E3	J-E2	8.0	PVC	120.0	-134	0.85	0.16
503	J-R1	J-R2	8.0	PVC	120.0	164	1.05	0.38
333	J-R2	J-R3	8.0	PVC	120.0	139	0.89	0.18
201	J-R2	J-B3	8.0	PVC	120.0	-155	0.99	0.13
288	J-R3	J-B5	8.0	PVC	120.0	132	0.85	0.14
344	J-B5	J-B4	12.0	PVC	120.0	-504	1.43	0.29

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - C5

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
268	J-B4	J-J1	8.0	PVC	120.0	-111	0.71	0.10
340	J-B4	J-B3	12.0	PVC	120.0	-394	1.12	0.18
405	J-B3	J-B2	12.0	PVC	120.0	-548	1.56	0.39
138	J-B2	J-B1	12.0	PVC	120.0	-721	2.05	0.22
183	J-B2	J-R1	8.0	PVC	120.0	173	1.10	0.15
407	J-B1	J-H2	12.0	PVC	120.0	457	1.30	0.28
300	J-B1	J-F3	8.0	PVC	120.0	-274	1.75	0.58
277	J-H2	J-H8	12.0	PVC	120.0	273	0.77	0.07
362	J-H2	J-H3	8.0	PVC	120.0	68	0.44	0.05
565	J-H1	J-H2	8.0	PVC	120.0	-109	0.70	0.20
354	J-H9	J-H1	8.0	PVC	120.0	65	0.42	0.05
355	J-H8	J-M3	12.0	PVC	120.0	218	0.62	0.06
414	J-H8	J-H9	8.0	PVC	120.0	77	0.49	0.08
268	J-H7	J-H8	8.0	PVC	120.0	29	0.18	0.01
544	J-H6	J-H7	8.0	PVC	120.0	0	0.00	0.00
322	J-H5	J-H6	8.0	PVC	120.0	10	0.06	0.00
301	J-H4	J-H5	8.0	PVC	120.0	17	0.11	0.00
365	J-H3	J-H4	8.0	PVC	120.0	24	0.15	0.01
261	J-H3	J-H7	8.0	PVC	120.0	37	0.24	0.01
343	J-J1	J-L2	8.0	PVC	120.0	82	0.53	0.07
441	J-J1	J-J2	8.0	PVC	120.0	-37	0.24	0.02
285	J-J1	J-H1	8.0	PVC	120.0	-165	1.05	0.21
299	J-J2	J-M4	8.0	PVC	120.0	-85	0.54	0.07
272	J-J2	J-L3	8.0	PVC	120.0	40	0.26	0.02
423	J-M4	J-M5	8.0	PVC	120.0	18	0.11	0.00
403	J-L3	J-L2	8.0	PVC	120.0	79	0.50	0.08
576	J-L2	J-L1	8.0	PVC	120.0	152	0.97	0.37
622	J-L1	J-C6	8.0	PVC	120.0	143	0.91	0.36
303	J-M5	J-M6	8.0	PVC	120.0	-24	0.16	0.01
310	J-L5	J-M5	8.0	PVC	120.0	-36	0.23	0.01
372	J-L5	J-L4	8.0	PVC	120.0	55	0.35	0.04
364	J-L4	J-L3	8.0	PVC	120.0	46	0.29	0.03
471	J-L6	J-L5	8.0	PVC	120.0	25	0.16	0.01

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - C5

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
314	J-L7	J-L8	8.0	PVC	120.0	-74	0.47	0.05
514	J-L7	J-L6	8.0	PVC	120.0	34	0.22	0.02
282	J-M6	J-L7	8.0	PVC	120.0	-33	0.21	0.01
286	J-L8	J-M1	8.0	PVC	120.0	-51	0.33	0.02
318	J-L9	J-L8	8.0	PVC	120.0	28	0.18	0.01
276	J-L10	J-L9	8.0	PVC	120.0	35	0.22	0.01
374	J-M1	J-M2	8.0	PVC	120.0	-58	0.37	0.04
843	J-M2	J-L10	8.0	PVC	120.0	39	0.25	0.04
186	J-M3	J-M2	8.0	PVC	120.0	103	0.66	0.06
530	J-M3	J-M4	8.0	PVC	120.0	110	0.70	0.19
127	J-C10	J-C9	8.0	PVC	120.0	-4	0.03	0.00
112	J-E4	J-E3	8.0	PVC	120.0	-3	0.02	0.00

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - L10

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-B1	6,531.73	0	6,799.60	116
J-B2	6,533.99	0	6,799.57	115
J-B3	6,548.84	0	6,799.48	108
J-B4	6,557.42	0	6,799.33	105
J-B5	6,565.21	0	6,799.34	101
J-C1	6,544.27	0	6,802.10	112
J-C2	6,546.33	6	6,801.21	110
J-C3	6,553.21	17	6,800.57	107
J-C4	6,561.66	6	6,799.91	103
J-C5	6,566.37	10	6,799.61	101
J-C6	6,568.06	1	6,799.34	100
J-C7	6,543.80	9	6,801.31	111
J-C8	6,534.75	9	6,800.98	115
J-C9	6,528.49	10	6,800.94	118
J-C10	6,526.65	4	6,800.94	119
J-D1	6,522.51	6	6,800.89	120
J-E1	6,527.57	7	6,800.86	118
J-E2	6,523.59	8	6,800.66	120
J-E3	6,518.44	8	6,800.47	122
J-E4	6,514.86	3	6,800.47	124
J-F1	6,533.99	6	6,800.87	115
J-F2	6,529.69	9	6,800.58	117
J-F3	6,526.75	6	6,800.32	118
J-H1	6,545.49	10	6,798.10	109
J-H2	6,528.26	7	6,798.27	117
J-H3	6,523.79	7	6,797.98	119
J-H4	6,519.73	7	6,797.95	120
J-H5	6,516.12	7	6,797.93	122
J-H6	6,517.18	10	6,797.91	121
J-H7	6,524.06	8	6,797.89	118
J-H8	6,527.29	6	6,797.76	117
J-H9	6,536.51	12	6,797.93	113
J-J1	6,554.69	8	6,798.12	105
J-J2	6,546.94	8	6,797.18	108
J-L1	6,556.36	9	6,798.63	105
J-L2	6,548.78	9	6,798.02	108
J-L3	6,543.55	8	6,797.18	110
J-L4	6,538.83	9	6,796.39	111
J-L5	6,534.10	6	6,795.63	113
J-L6	6,528.03	9	6,794.86	115
J-L7	6,521.60	6	6,794.08	118
J-L8	6,517.62	5	6,791.84	119
J-L9	6,513.52	7	6,787.38	118
J-L10 (FF APPLIED)	6,510.06	1,500	6,783.57	118
J-M1	6,522.82	7	6,792.31	117
J-M2	6,530.94	6	6,792.95	113
J-M3	6,534.97	5	6,796.67	113
J-M4	6,542.86	8	6,796.63	110

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - L10

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-M5	6,535.42	6	6,795.62	113
J-M6	6,527.96	9	6,794.80	115
J-P1	6,549.00	6	6,800.86	109
J-P2	6,554.43	10	6,800.29	106
J-P3	6,558.26	6	6,799.90	105
J-R1	6,545.43	8	6,799.56	110
J-R2	6,552.17	6	6,799.56	107
J-R3	6,559.94	7	6,799.44	104

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	6,805.00	1,868	6,805.00
R-2	6,805.00	0	6,805.00

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - L10

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
311	R-1	J-C1	12.0	PVC	120.0	1,868	5.30	2.90
172	J-C1	J-C2	8.0	PVC	120.0	467	2.98	0.89
842	J-C1	J-B1	12.0	PVC	120.0	1,005	2.85	2.50
443	J-C2	J-C3	8.0	PVC	120.0	234	1.50	0.64
254	J-C2	J-P1	8.0	PVC	120.0	226	1.44	0.34
297	J-C4	J-C5	8.0	PVC	120.0	192	1.23	0.30
200	J-C6	R-2	12.0	PVC	120.0	0	0.00	0.00
331	J-C6	J-B5	12.0	PVC	120.0	-26	0.07	0.00
527	J-C3	J-C4	8.0	PVC	120.0	218	1.39	0.66
296	J-C5	J-C6	8.0	PVC	120.0	182	1.16	0.27
442	J-P1	J-P2	8.0	PVC	120.0	221	1.41	0.57
262	J-P3	J-C4	8.0	PVC	120.0	-19	0.12	0.00
258	J-P3	J-R2	8.0	PVC	120.0	224	1.43	0.34
333	J-P2	J-P3	8.0	PVC	120.0	210	1.34	0.39
406	J-C7	J-C8	8.0	PVC	120.0	170	1.09	0.32
207	J-C7	J-C1	8.0	PVC	120.0	-396	2.53	0.79
287	J-C8	J-C9	8.0	PVC	120.0	72	0.46	0.05
388	J-C9	J-D1	8.0	PVC	120.0	57	0.37	0.04
361	J-D1	J-E1	8.0	PVC	120.0	51	0.33	0.03
493	J-E1	J-C8	8.0	PVC	120.0	-89	0.57	0.12
265	J-E1	J-F1	8.0	PVC	120.0	-24	0.15	0.01
351	J-F1	J-C7	8.0	PVC	120.0	-216	1.38	0.44
309	J-F1	J-F2	8.0	PVC	120.0	186	1.19	0.29
290	J-E2	J-E1	8.0	PVC	120.0	-157	1.00	0.20
293	J-F2	J-F3	8.0	PVC	120.0	177	1.13	0.25
265	J-F3	J-E3	8.0	PVC	120.0	-138	0.88	0.14
312	J-E3	J-E2	8.0	PVC	120.0	-150	0.95	0.20
503	J-R1	J-R2	8.0	PVC	120.0	10	0.07	0.00
333	J-R2	J-R3	8.0	PVC	120.0	112	0.72	0.12
201	J-R2	J-B3	8.0	PVC	120.0	116	0.74	0.08
288	J-R3	J-B5	8.0	PVC	120.0	105	0.67	0.09
344	J-B5	J-B4	12.0	PVC	120.0	79	0.22	0.01
268	J-B4	J-J1	8.0	PVC	120.0	435	2.78	1.21

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - L10

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
340	J-B4	J-B3	12.0	PVC	120.0	-356	1.01	0.15
405	J-B3	J-B2	12.0	PVC	120.0	-239	0.68	0.08
138	J-B2	J-B1	12.0	PVC	120.0	-258	0.73	0.03
183	J-B2	J-R1	8.0	PVC	120.0	19	0.12	0.00
407	J-B1	J-H2	12.0	PVC	120.0	1,057	3.00	1.33
300	J-B1	J-F3	8.0	PVC	120.0	-310	1.98	0.73
277	J-H2	J-H8	12.0	PVC	120.0	779	2.21	0.51
362	J-H2	J-H3	8.0	PVC	120.0	170	1.09	0.29
565	J-H1	J-H2	8.0	PVC	120.0	-100	0.64	0.17
354	J-H9	J-H1	8.0	PVC	120.0	-131	0.83	0.17
355	J-H8	J-M3	12.0	PVC	120.0	1,023	2.90	1.09
414	J-H8	J-H9	8.0	PVC	120.0	-119	0.76	0.17
268	J-H7	J-H8	8.0	PVC	120.0	131	0.83	0.13
544	J-H6	J-H7	8.0	PVC	120.0	30	0.19	0.02
322	J-H5	J-H6	8.0	PVC	120.0	40	0.26	0.02
301	J-H4	J-H5	8.0	PVC	120.0	47	0.30	0.02
365	J-H3	J-H4	8.0	PVC	120.0	54	0.34	0.03
261	J-H3	J-H7	8.0	PVC	120.0	109	0.70	0.09
343	J-J1	J-L2	8.0	PVC	120.0	97	0.62	0.10
441	J-J1	J-J2	8.0	PVC	120.0	289	1.84	0.94
285	J-J1	J-H1	8.0	PVC	120.0	40	0.26	0.02
299	J-J2	J-M4	8.0	PVC	120.0	268	1.71	0.55
272	J-J2	J-L3	8.0	PVC	120.0	14	0.09	0.00
423	J-M4	J-M5	8.0	PVC	120.0	308	1.97	1.01
403	J-L3	J-L2	8.0	PVC	120.0	-286	1.83	0.84
576	J-L2	J-L1	8.0	PVC	120.0	-198	1.26	0.61
622	J-L1	J-C6	8.0	PVC	120.0	-207	1.32	0.71
303	J-M5	J-M6	8.0	PVC	120.0	329	2.10	0.82
310	J-L5	J-M5	8.0	PVC	120.0	27	0.17	0.01
372	J-L5	J-L4	8.0	PVC	120.0	-283	1.81	0.76
364	J-L4	J-L3	8.0	PVC	120.0	-292	1.87	0.79
471	J-L6	J-L5	8.0	PVC	120.0	-250	1.60	0.77
314	J-L7	J-L8	8.0	PVC	120.0	555	3.54	2.23

Bella Mesa North - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P - 7 Closed & FF Applied @ J - L10

FlexTable: Pipe Table

Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
514	J-L7	J-L6	8.0	PVC	120.0	-241	1.54	0.78
282	J-M6	J-L7	8.0	PVC	120.0	320	2.04	0.72
286	J-L8	J-M1	8.0	PVC	120.0	-251	1.60	0.47
318	J-L9	J-L8	8.0	PVC	120.0	-801	5.11	4.46
276	J-L10 (FF APPLIED)	J-L9	8.0	PVC	120.0	-794	5.07	3.81
374	J-M1	J-M2	8.0	PVC	120.0	-258	1.64	0.64
843	J-M2	J-L10 (FF APPLIED)	8.0	PVC	120.0	706	4.51	9.39
186	J-M3	J-M2	8.0	PVC	120.0	970	6.19	3.72
530	J-M3	J-M4	8.0	PVC	120.0	48	0.31	0.04
127	J-C10	J-C9	8.0	PVC	120.0	-4	0.03	0.00
112	J-E4	J-E3	8.0	PVC	120.0	-3	0.02	0.00

Appendix D – Wastewater Flows

Bella Messa North
Preliminary Utility Report

Redland
3/4/2025

Wastewater Flow

Peaking Factor:

Peak Hour (PHD) 5.0

Phase (SF -Residential)	Use	Dwelling Units	Acres (AC)	Equivalent (SFE/DU)	SFE	Avg Day (GPD/DU)	Avg Day (GPD)	Avg Day (GPM)	Peak Design (GPM)	Peak Design (GPD)	Peak Design Including I/I (GPM)	Peak Design Including I/I (GPD)
1	SF	113	45.33	1.00	113.00	200	22,600.00	15.69	78.47	113,000.00	80.04	115,260.00
1.5	SF	119	39.55	1.00	119.00	200	23,800.00	16.53	82.64	119,000.00	84.29	121,380.00
2	SF	137	43.28	1.00	137.00	200	27,400.00	19.03	95.14	137,000.00	97.04	139,740.00
3	SF	156	165.04	1.00	156.00	200	31,200.00	21.67	108.33	156,000.00	110.50	159,120.00
Totals:	-	525	293.2	-	525.00	-	105,000.00	72.92	364.58	525,000.00	371.88	535,500.00

*Per Town Of Castle Rock Wastewater Collection Desing 2018 Criteria Manual, Section 4.4.1

Appendix E – Wastewater Hydraulic Modeling

Design Point Flows

Design Point	Unit Progression	Total Units	Equivalent (SFE/DU)	SFE	Avg Day (GPD/DU)	Avg Day (GPD)	Avg Day (GPM)	Avg Day (CFS)	Peak Design (GPM)	Peak Design Including I/I (GPM)	Peak Design (CFS)
1.1	77 Phase 1.5 Units	77	1.00	77.00	200	15,400.00	10.69	0.02	53.47	54.54	0.12
1.2	42 Phase 1.5 Units	42	1.00	42.00	200	8,400.00	5.83	0.01	29.17	29.75	0.07
1.3	DP1.1 + DP1.2 + 79 Phase 1 Units	198	1.00	198.00	200	39,600.00	27.50	0.06	137.50	140.25	0.31
1.4	DP1.3 + 34 Phase 1 Units	232	1.00	232.00	200	46,400.00	32.22	0.07	161.11	164.33	0.37
2.1	DP1.4 + 53 Phase 2 Units	285	1.00	285.00	200	57,000.00	39.58	0.09	197.92	201.88	0.45
2.2	DP2.1 + 61 Phase 2 Units	346	1.00	346.00	200	69,200.00	48.06	0.11	240.28	245.08	0.55
3.1	125 Phase 3 Units	125	1.00	125.00	200	25,000.00	17.36	0.04	86.81	88.54	0.20
3.2	DP3.1 + 34 Phase 3 Units	159	1.00	159.00	200	31,800.00	22.08	0.05	110.42	112.63	0.25
3.3	DP3.2 + 20 Phase 3 Units	179	1.00	179.00	200	35,800.00	24.86	0.06	124.31	126.79	0.28
Lift Station	All Units	525	-	525	-	105,000.00	72.92	0.16	364.58	371.88	0.83

*Per Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual, Section 4.4.2

Channel Report

Bella Mesa North - Avg Day - 8in Sanitary Main @ 0.4%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 0.40

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.16

Highlighted

Depth (ft) = 0.19

Q (cfs) = 0.160

Area (sqft) = 0.08

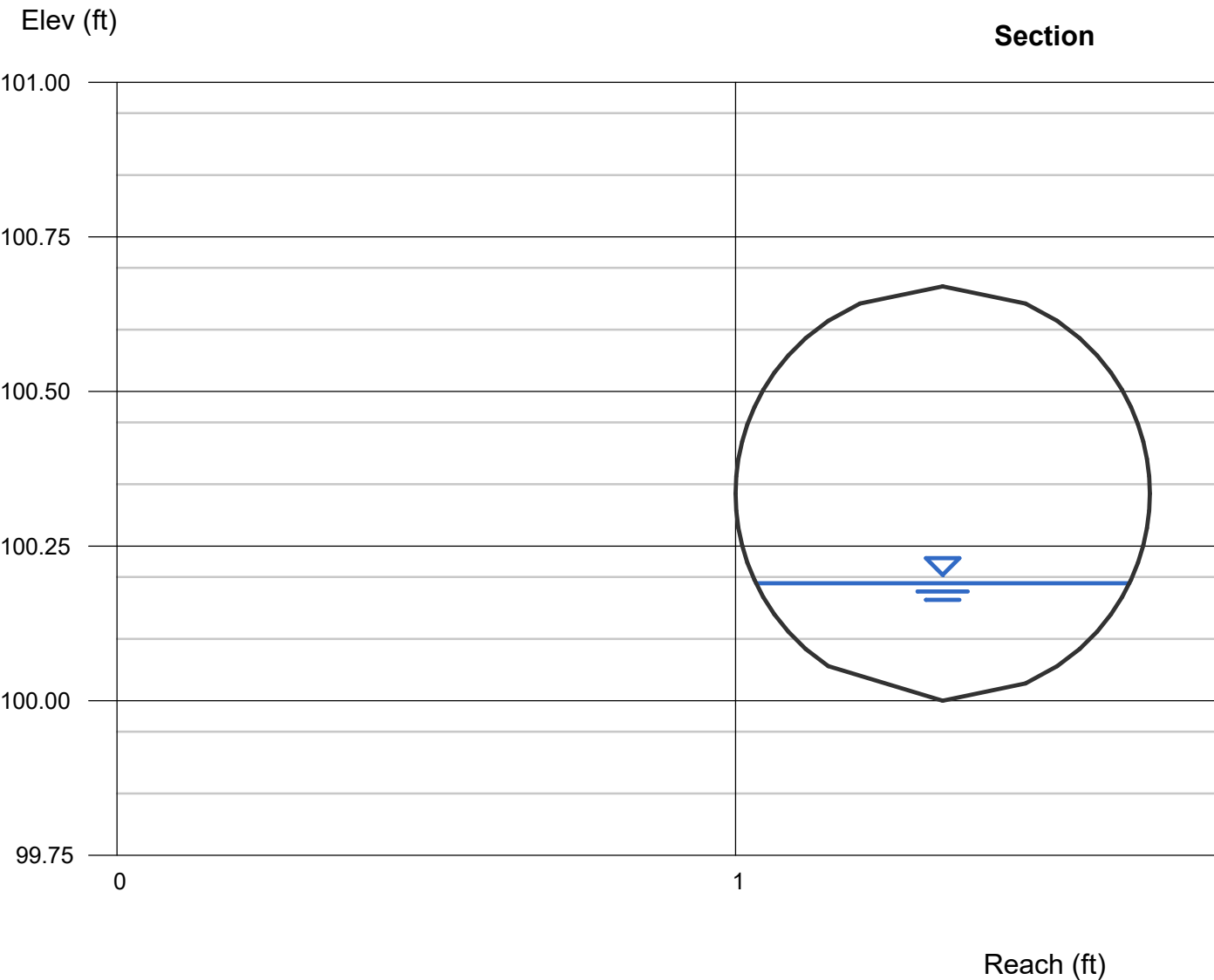
Velocity (ft/s) = 1.94

Wetted Perim (ft) = 0.75

Crit Depth, Yc (ft) = 0.19

Top Width (ft) = 0.60

EGL (ft) = 0.25



Channel Report

Bella Mesa North - Avg Day - 8in Sanitary Main @ 7.5%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 7.50

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.16

Highlighted

Depth (ft) = 0.10

Q (cfs) = 0.160

Area (sqft) = 0.03

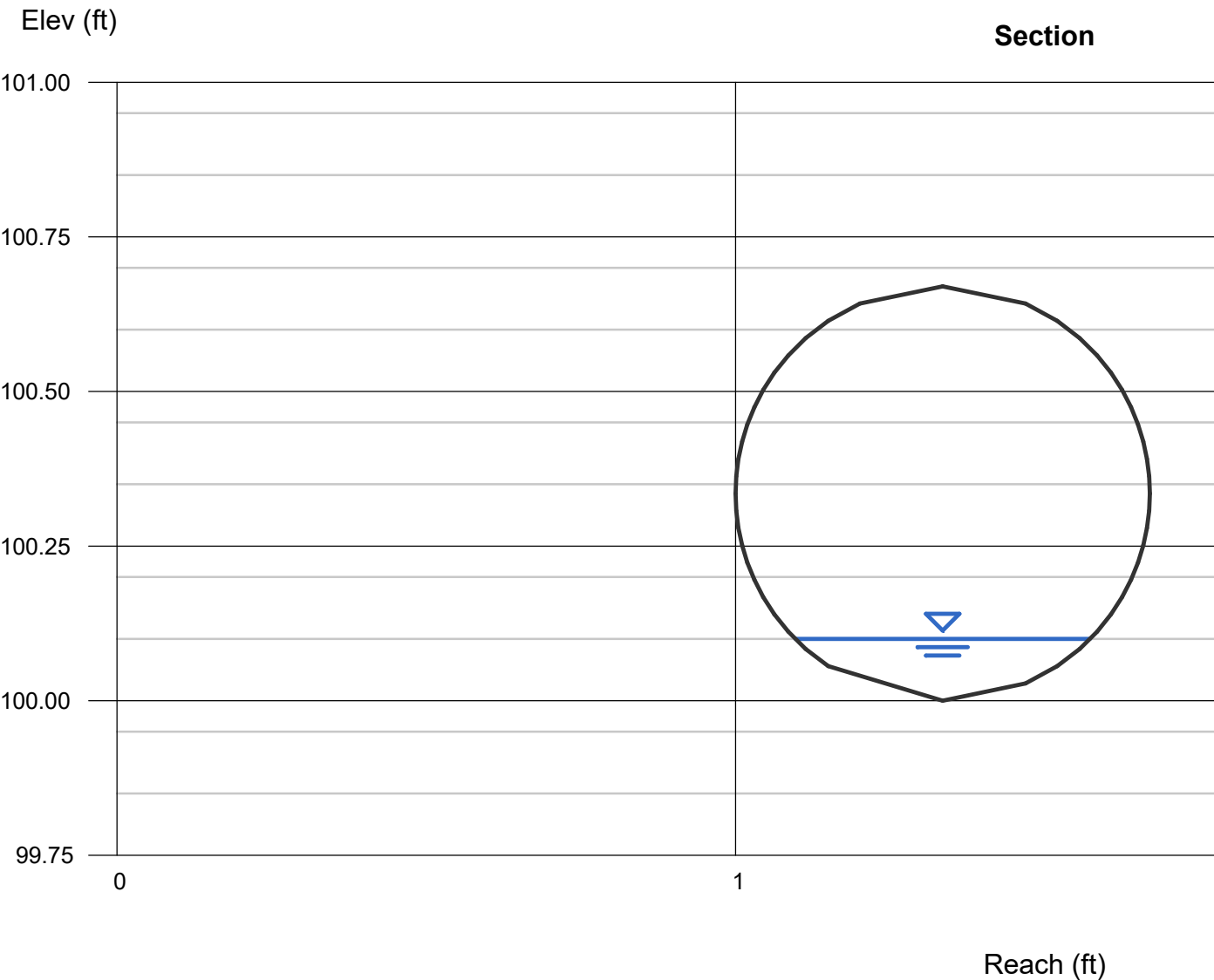
Velocity (ft/s) = 4.83

Wetted Perim (ft) = 0.53

Crit Depth, Yc (ft) = 0.19

Top Width (ft) = 0.48

EGL (ft) = 0.46



Channel Report

Bella Mesa North - Peak Design - 8in Sanitary Main @ 0.4%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 0.40

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.83

Highlighted

Depth (ft) = 0.50

Q (cfs) = 0.830

Area (sqft) = 0.28

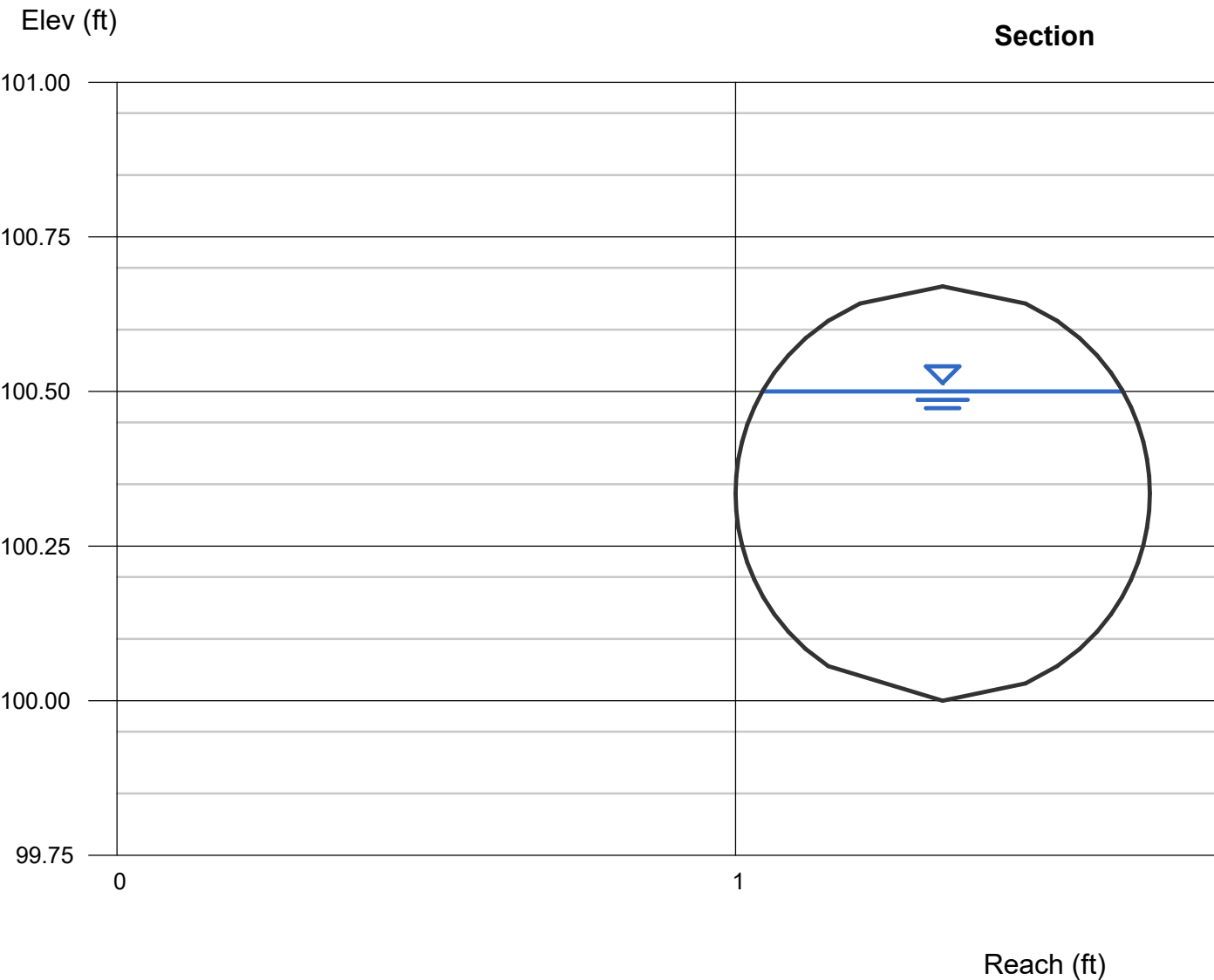
Velocity (ft/s) = 2.93

Wetted Perim (ft) = 1.40

Crit Depth, Yc (ft) = 0.44

Top Width (ft) = 0.58

EGL (ft) = 0.63



Channel Report

Bella Mesa North - Peak Design - 8in Sanitary Main @ 7.5%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 7.50

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.83

Highlighted

Depth (ft) = 0.21

Q (cfs) = 0.830

Area (sqft) = 0.09

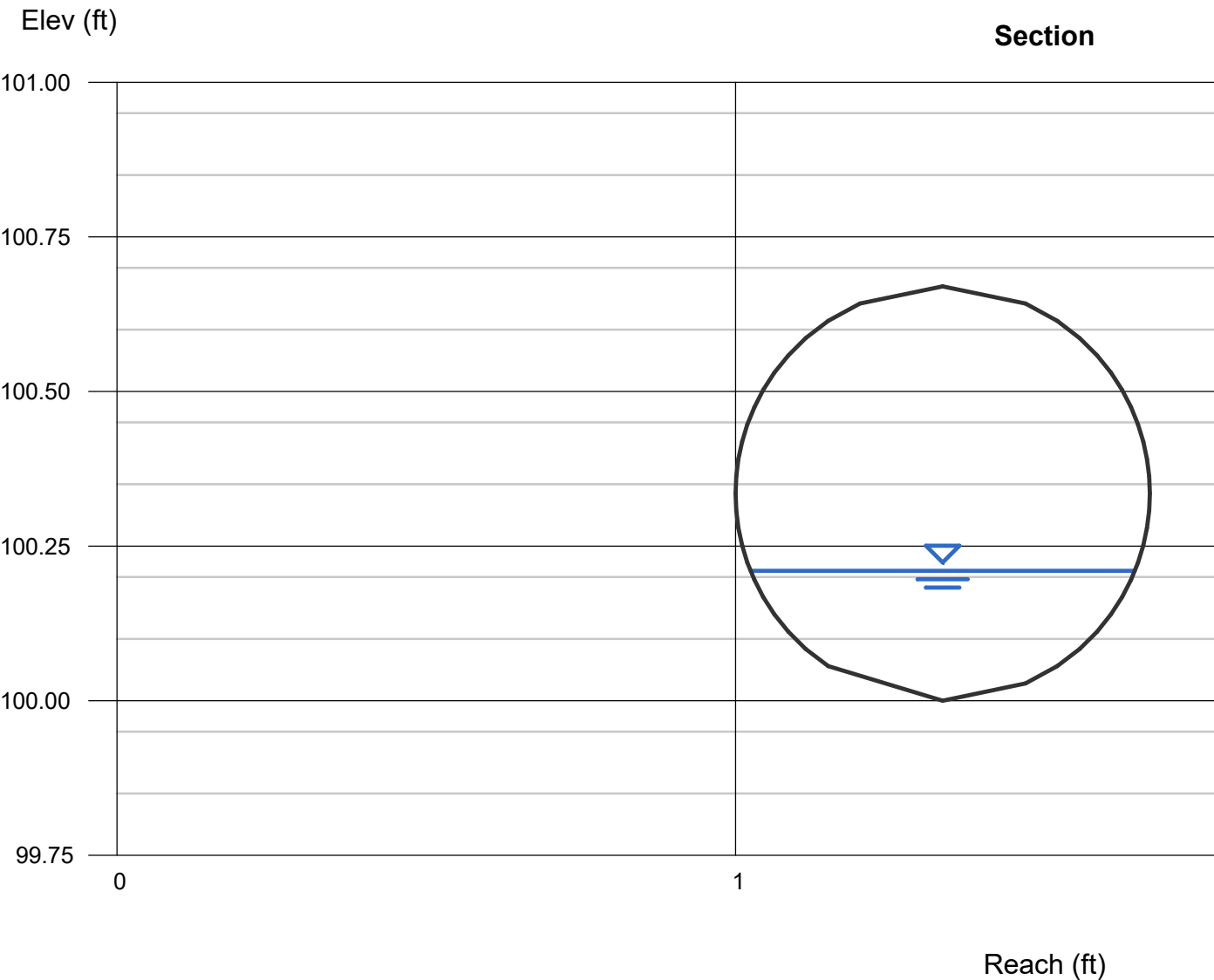
Velocity (ft/s) = 8.75

Wetted Perim (ft) = 0.80

Crit Depth, Yc (ft) = 0.44

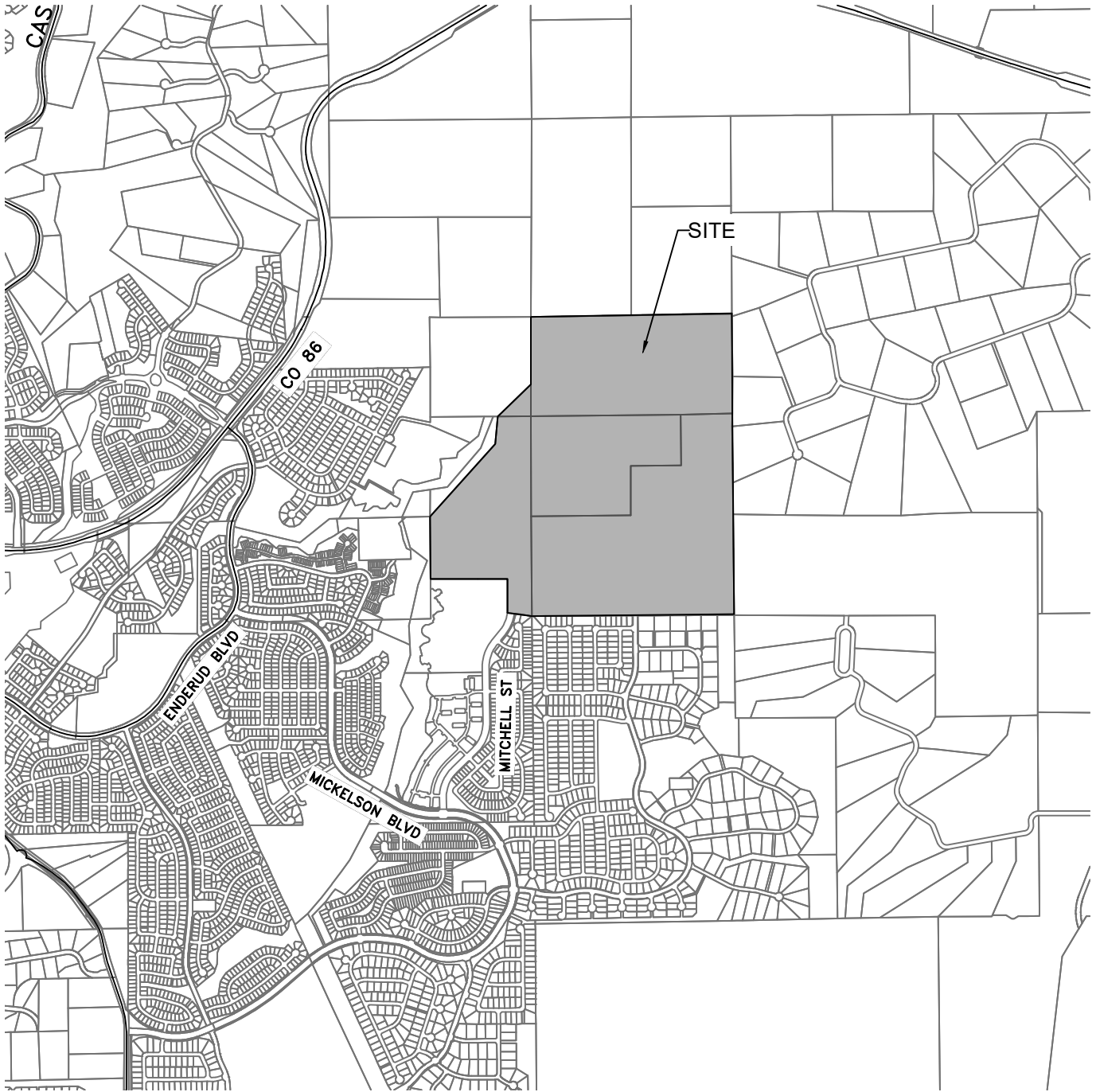
Top Width (ft) = 0.62

EGL (ft) = 1.40



Appendix F – Maps and Plans

I:\2017\17026 - Bella Mesa\CADD\Exhibits\Sunset Point\Vicinity Map.dwg, tab: VICINITY MAP, Jun 11, 2024 - 11:06am, idudlev



VICINITY MAP
1" = 2000'

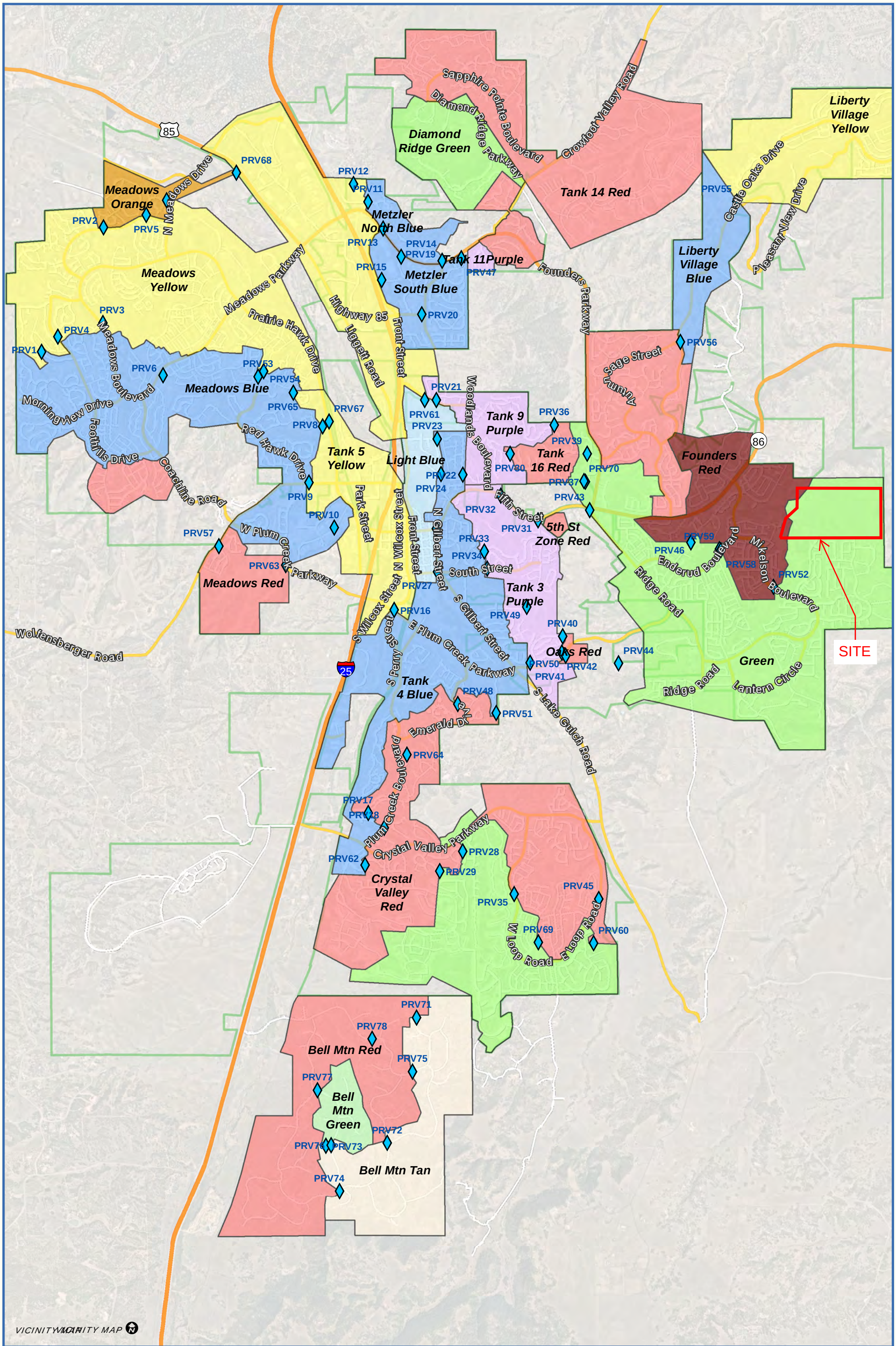


VICINITY MAP

BELLA MESA NORTH

CASTLE ROCK COLORADO

DATE	06.11.2024
PROJ. NO.	17026.004
SHEET	VIC



VICINITY MAP



0 1,950 3,900 7,800 11,700 Feet

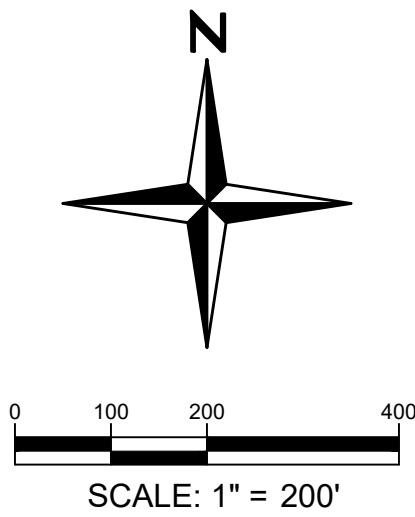
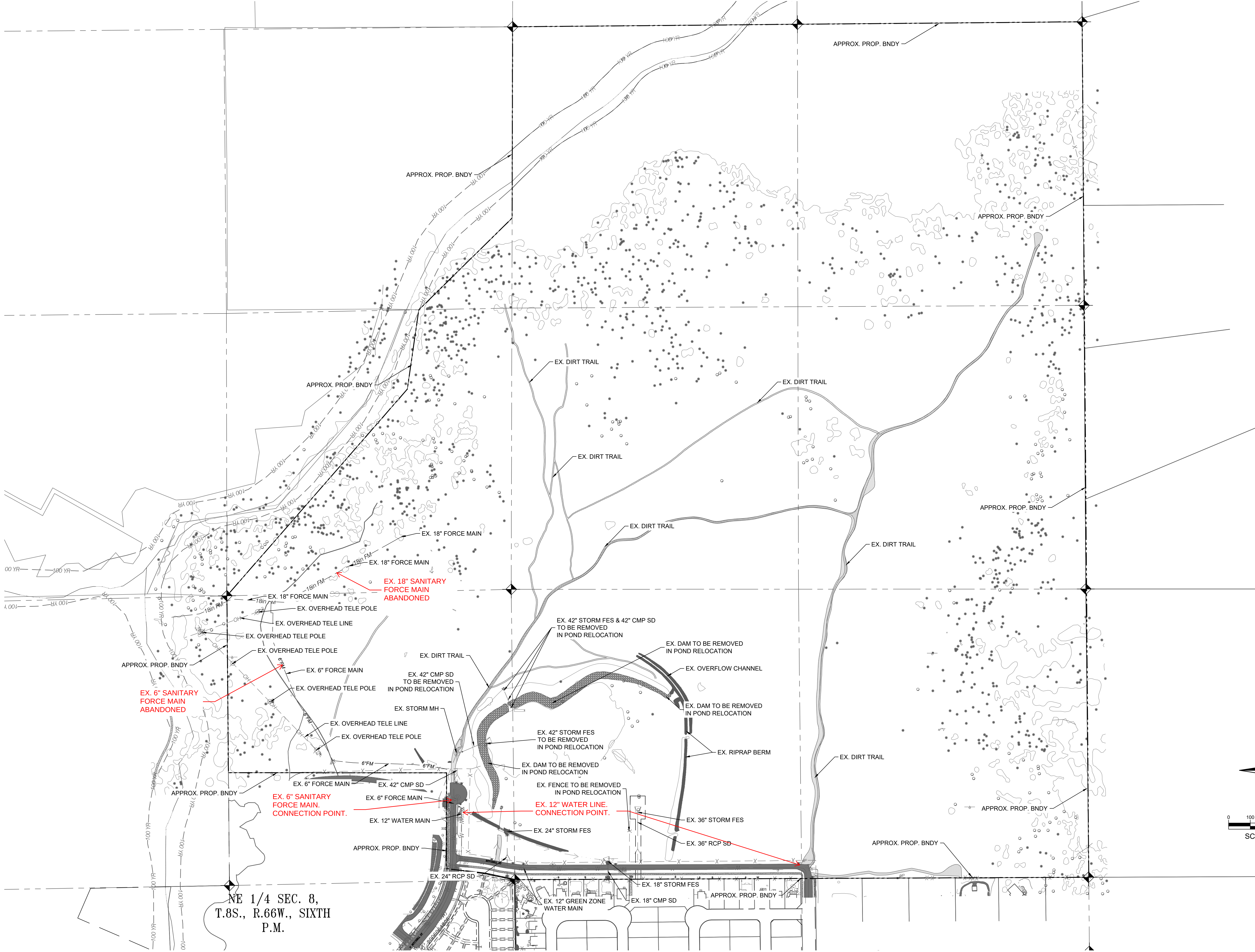
1 inch = 3,833 feet



Disclaimer: The data presented has been compiled from various sources, each of which introduces varying degrees of inaccuracies or inconsistencies. Such discrepancies in data are inherent and in supplying this product the Town of Castle Rock assumes no liability for its use or accuracy. Questions or comments regarding the cartographic composition of this map including, but not limited to, errors, omissions, corrections, and/or updates, should be directed to the Utilities Department, Town of Castle Rock, (720) 733-6056. Copyright 2022, Town of Castle Rock Utilities Mapping.

CASTLE ROCK WATER
FIGURE 2.7
PRESSURE ZONES AND PRVs

I:\2017\17026 - Bella Mesa\Engineering\Reports\Due Diligence\Appendix A - Vicinity Map & PD\Bella Mesa - Proposed Site (All sites).dwg tab: Layout1 May 28, 2024 - 11:44am jldalley



NE 1/4 SEC. 8,
T.8S., R.66W., SIXTH
P.M.

**NOT FOR
CONSTRUCTION**

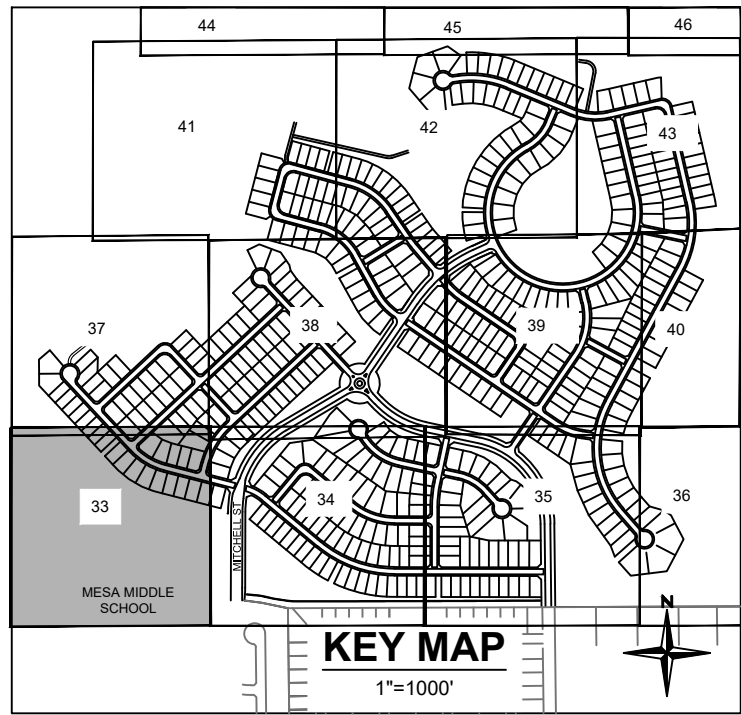
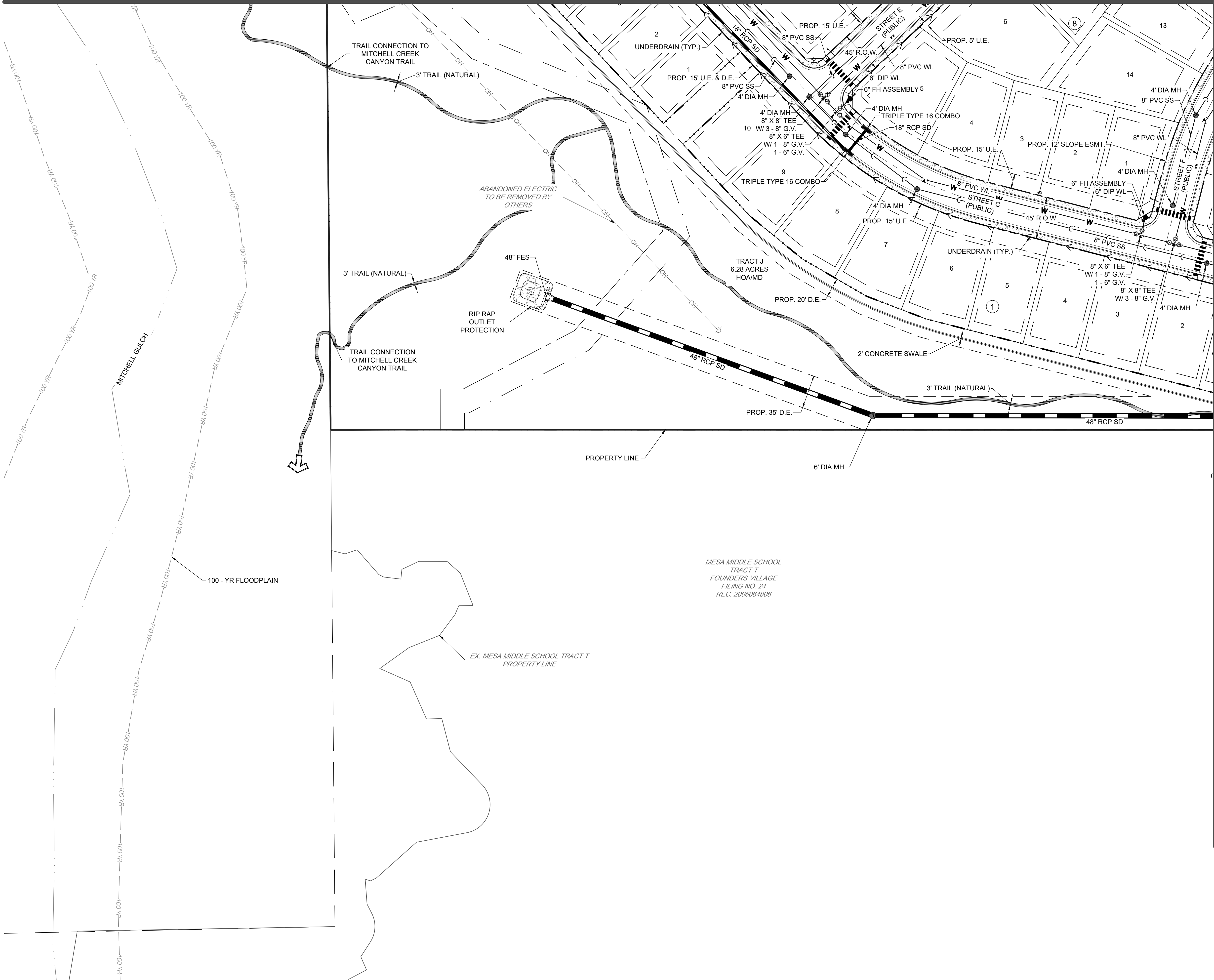
PROJECT NO. 17026		NOTES	
DATE	NO.	DATE	NO.

**SUNSET POINT
EXHIBIT
EXISTING SITE OVERALL UTILITY LOCATIONS**

SITE DEVELOPMENT PLAN
BELLA MESA NORTH

LOCATED IN THE PORTIONS OF THE SOUTHWEST QUARTER SECTION 4, THE SOUTHEAST QUARTER OF SECTION 5, THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 8, AND THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 9, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN AND A PORTION OF THE EAST HALF OF SECTION 6, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO.
TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

MATCHLINE - SEE SHEET 37 OF 87



EXISTING LEGEND

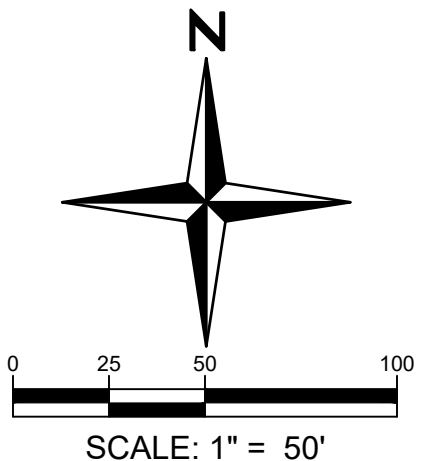
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- EXISTING R.O.W.
- EXISTING LOT LINE
- EXISTING EASEMENT
- SECTION LINE
- ROAD CENTERLINE
- EDGE OF PAVEMENT
- CURB AND GUTTER
- CONCRETE
- FENCE
- RETAINING WALL
- EXISTING WATERLINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING ELECTRIC LINE
- EXISTING GAS LINE
- EXISTING OVERHEAD ELECTRIC LINE

PROPOSED LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED R.O.W.
- PROPOSED LOT LINE
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED ROAD CENTERLINE
- PROPOSED CURB AND GUTTER (CATCH)
- PROPOSED CURB AND GUTTER (SPILL)
- PROPOSED SIDEWALK
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER LINE
- PROPOSED MANHOLE w/ DIA. (FT.)
- PROPOSED INLET
- PROPOSED FLARED END SECTION
- PROPOSED WATER BEND
- PROPOSED WATER CROSS
- PROPOSED WATER TEE
- PROPOSED WATER REDUCER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED PLUG/CAP
- PROPOSED RETAINING WALL
- TRACT BOUNDARY
- PROPOSED SWALE LINE
- UNDERDRAIN

NOTES

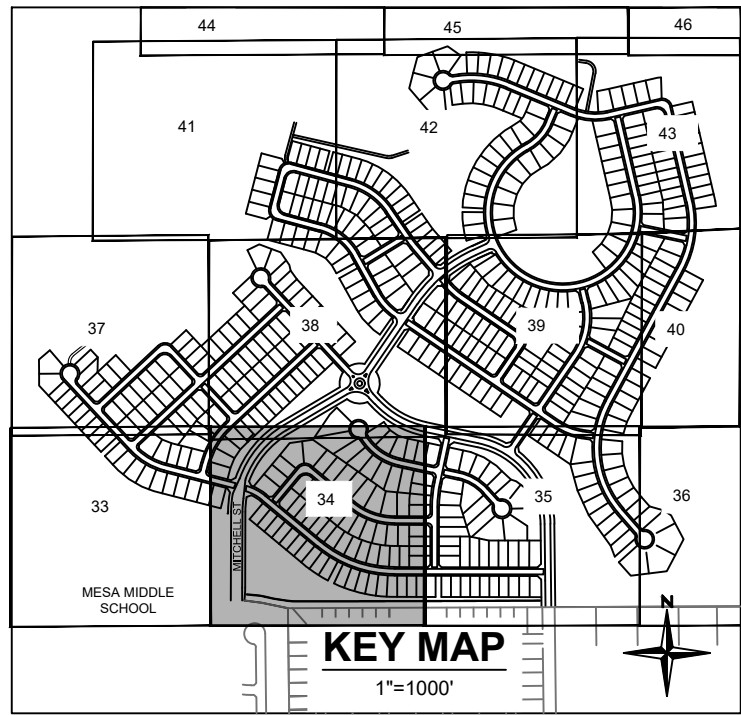
- THIS SITE IS LOCATED WITHIN THE TOWN OF CASTLE ROCK GREEN WATER PRESSURE ZONE.
- ALL PROPOSED EASEMENTS MUST BE RECORDED PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS.
- ALL UTILITY EASEMENTS FOR WATER AND WASTEWATER LINES SHALL BE FOR THE EXCLUSIVE USE OF THE TOWN SO THAT ACCESS AND MAINTENANCE MAY BE PERFORMED.
- THE MINIMUM SEPARATION BETWEEN WATERLINES, SANITARY SEWER AND STORM SEWER LINES IS 10 FEET.
- THE MINIMUM SEPARATION BETWEEN WATER SERVICE LINES IS 5 FEET.
- ANY TIE-IN, CROSSING OR LOWERING OF TOWN CRITICAL INFRASTRUCTURE WILL REQUIRE A TIME AND MATERIALS PERMIT (TMU) WITH FEES REQUIRED PRIOR TO CONSTRUCTION.



PROJECT NO.	DATE	NO.	NOTES
17026.004	12/05/2024	1	FIRST SUBMITTAL TO TOWN
	04/04/2025	2	SECOND SUBMITTAL TO TOWN
	09/27/2025	3	THIRD SUBMITTAL TO TOWN

SITE DEVELOPMENT PLAN
BELLA MESA NORTH

LOCATED IN THE PORTIONS OF THE SOUTHWEST QUARTER SECTION 4, THE SOUTHEAST QUARTER OF SECTION 5, THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 8, AND THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 9, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN AND A PORTION OF THE EAST HALF OF SECTION 6, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO.
TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

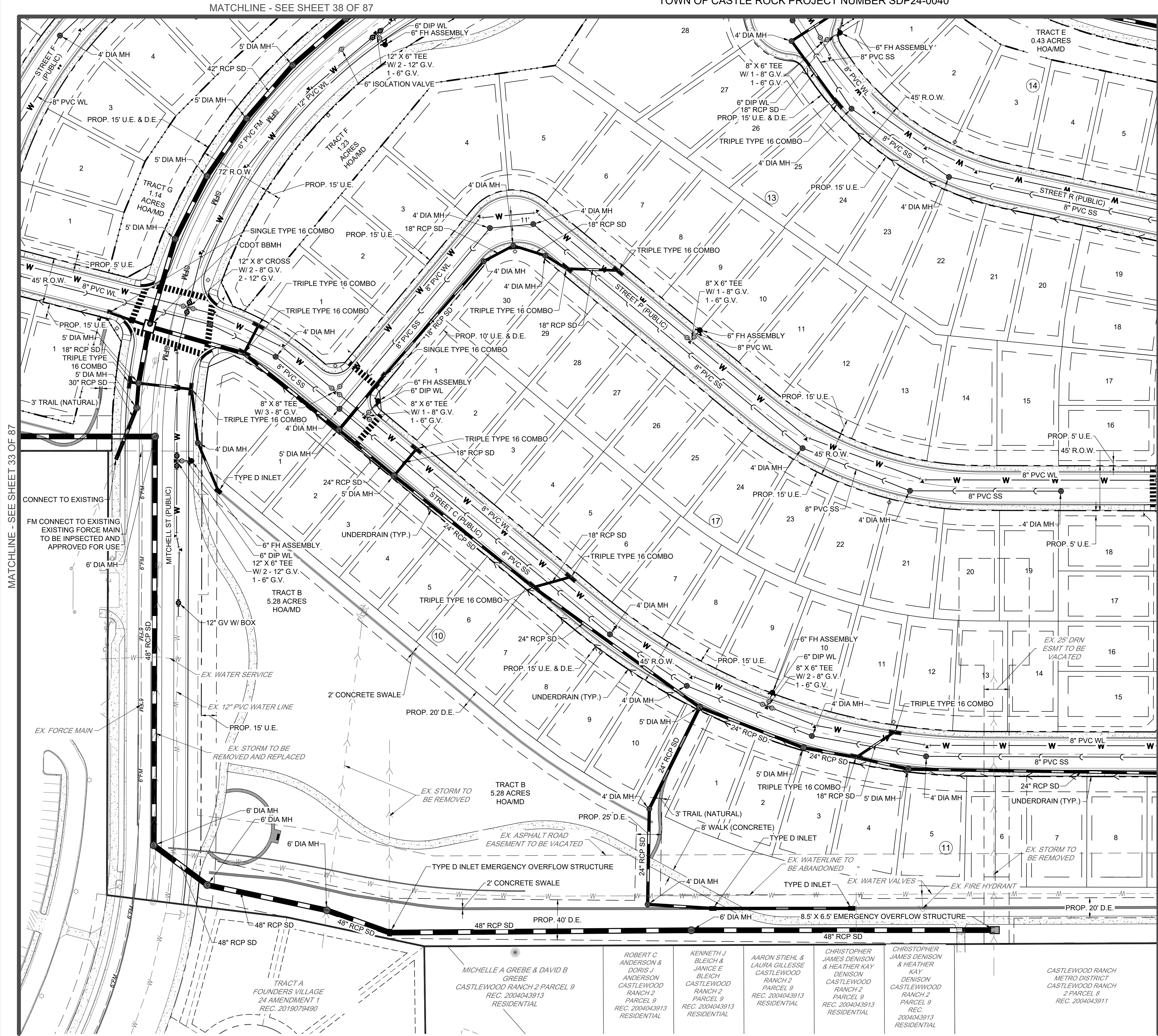


Redland
WHERE GREAT PLACES BEGIN

Land Planning
Civil Engineering
Landscape Architecture
Construction Management

720.283.6783
REDLAND.COM

NOT FOR
CONSTRUCTION



EXISTING LEGEND

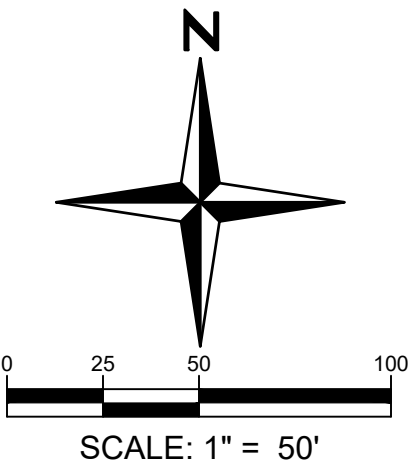
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- EXISTING R.O.W.
- EXISTING LOT LINE
- EXISTING EASEMENT
- SECTION LINE
- ROAD CENTERLINE
- EDGE OF PAVEMENT
- CURB AND GUTTER
- CONCRETE
- FENCE
- RETAINING WALL
- EXISTING WATERLINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING ELECTRIC LINE
- EXISTING GAS LINE
- EXISTING OVERHEAD ELECTRIC LINE

PROPOSED LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED R.O.W.
- PROPOSED LOT LINE
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED ROAD CENTERLINE
- PROPOSED CURB AND GUTTER (CATCH)
- PROPOSED CURB AND GUTTER (SPILL)
- PROPOSED SIDEWALK
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER LINE
- PROPOSED MANHOLE w/ DIA. (FT.)
- PROPOSED INLET
- PROPOSED FLARED END SECTION
- PROPOSED WATER BEND
- PROPOSED WATER CROSS
- PROPOSED WATER TEE
- PROPOSED WATER REDUCER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED PLUG/CAP
- PROPOSED RETAINING WALL
- TRACT BOUNDARY
- PROPOSED SWALE LINE
- UNDERDRAIN

NOTES

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BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

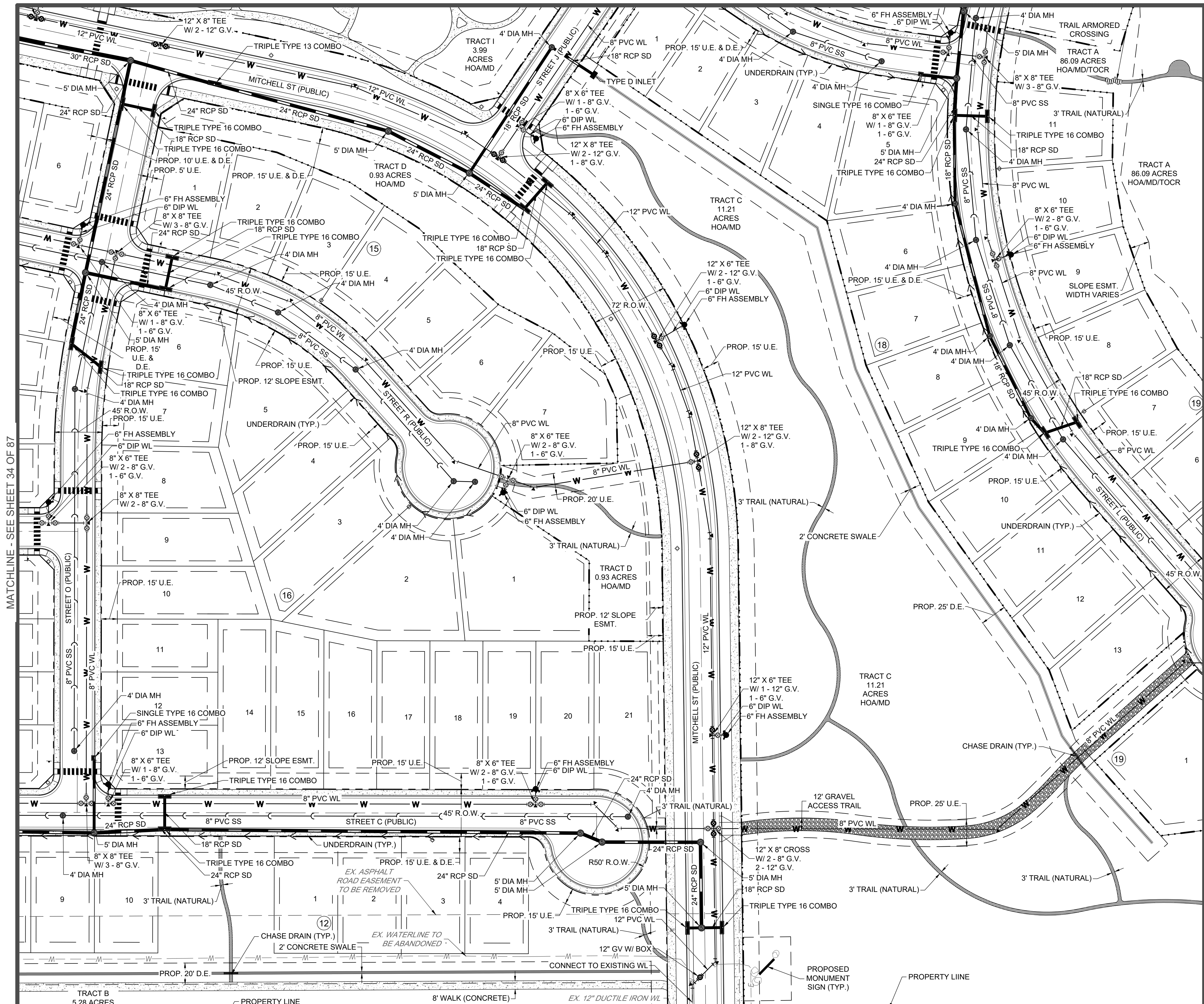
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34 OF 87

SITE DEVELOPMENT PLAN
BELLA MESA NORTH

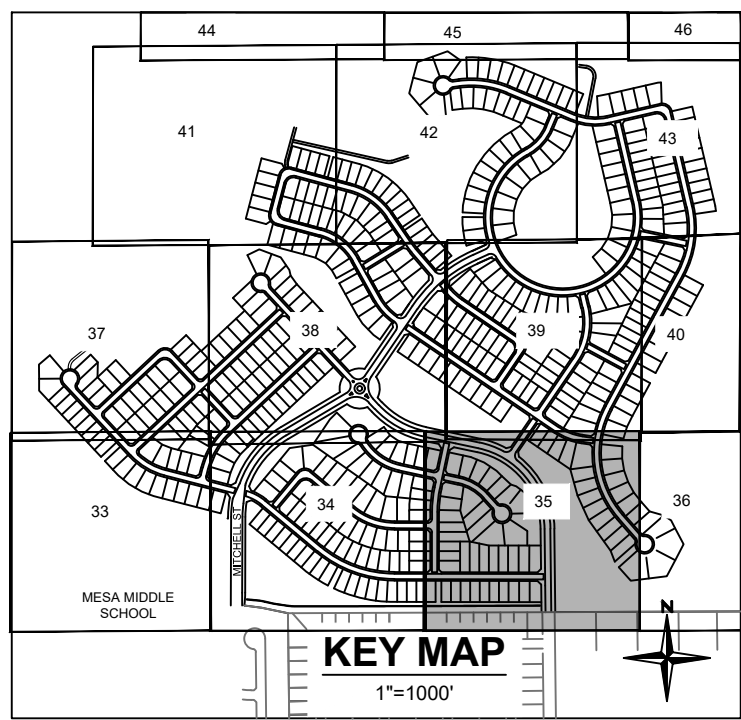
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TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

MATCHLINE - SEE SHEET 39 OF 87

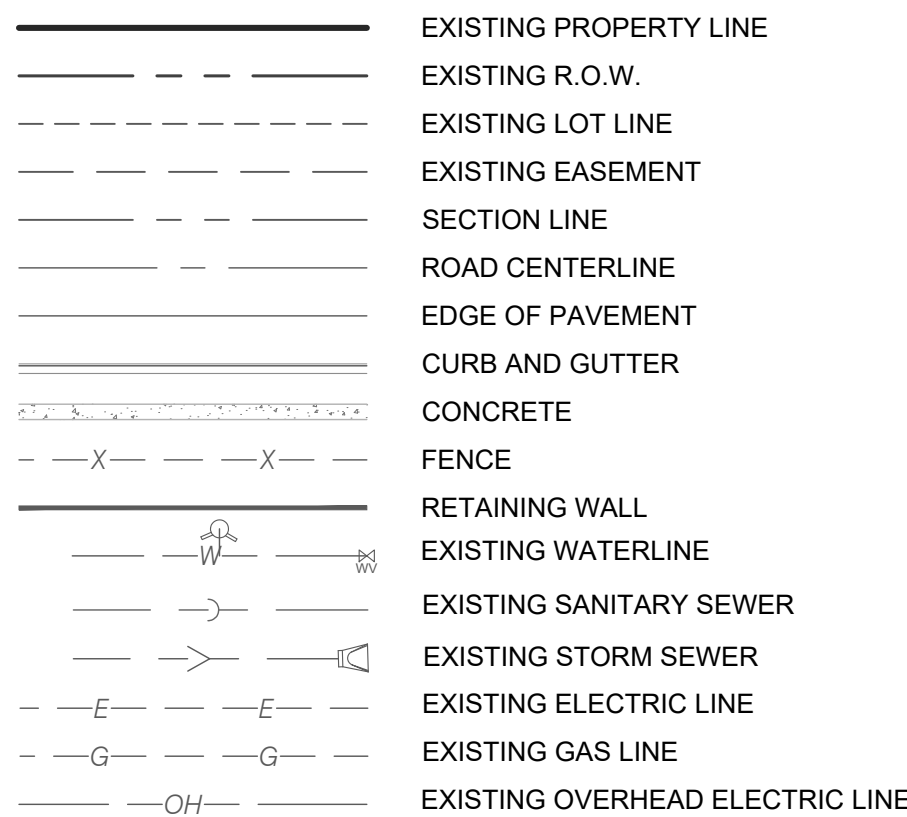


MATCHLINE - SEE SHEET 34 OF 87

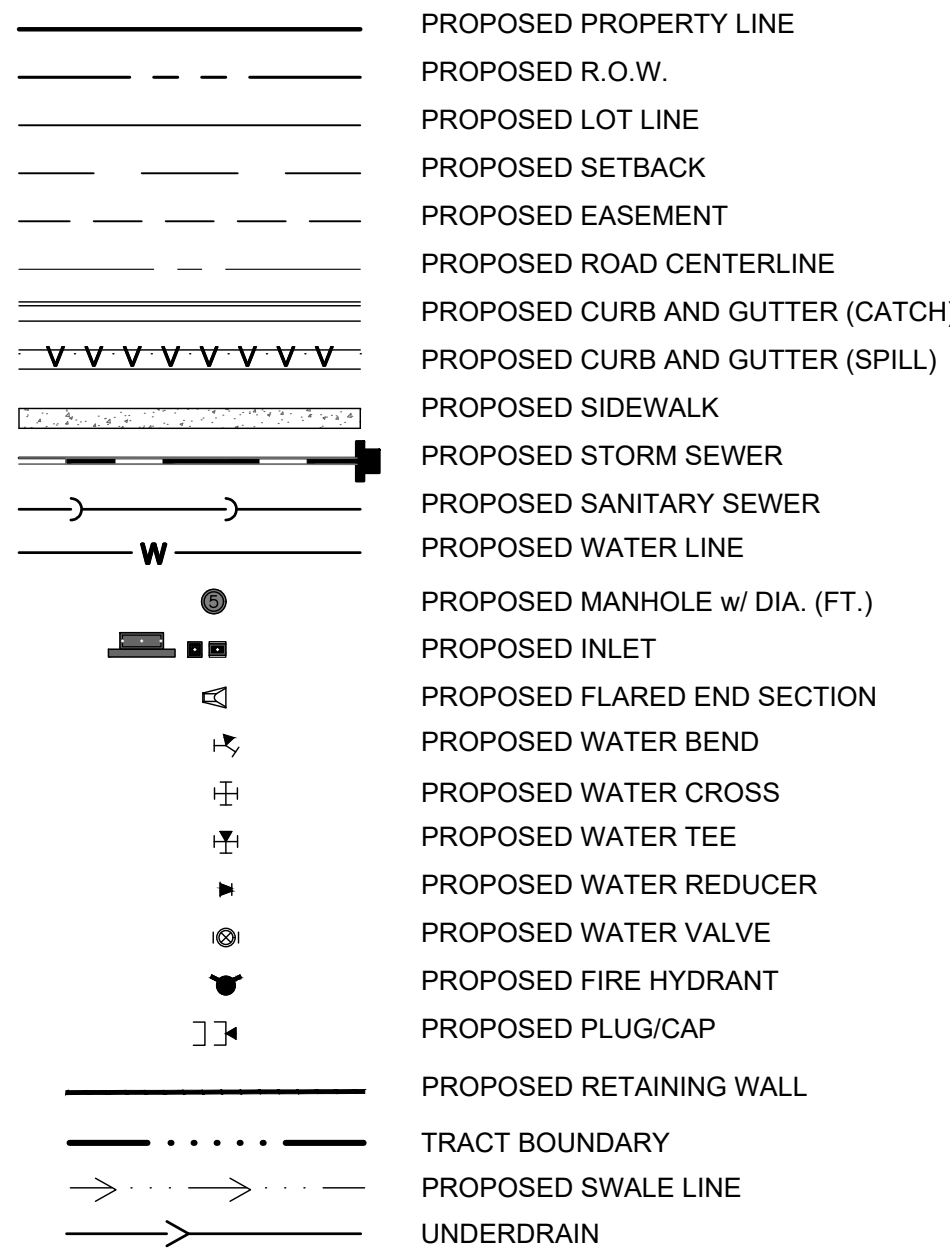
MATCHLINE - SEE SHEET 36 OF 87



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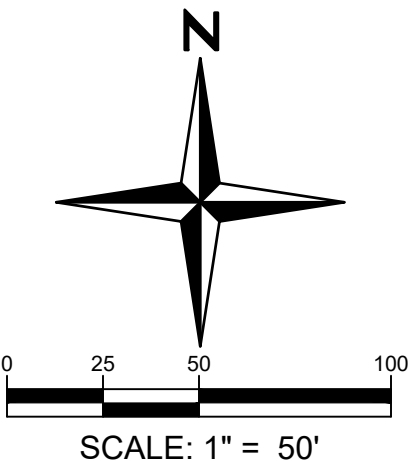


PROPOSED LEGEND



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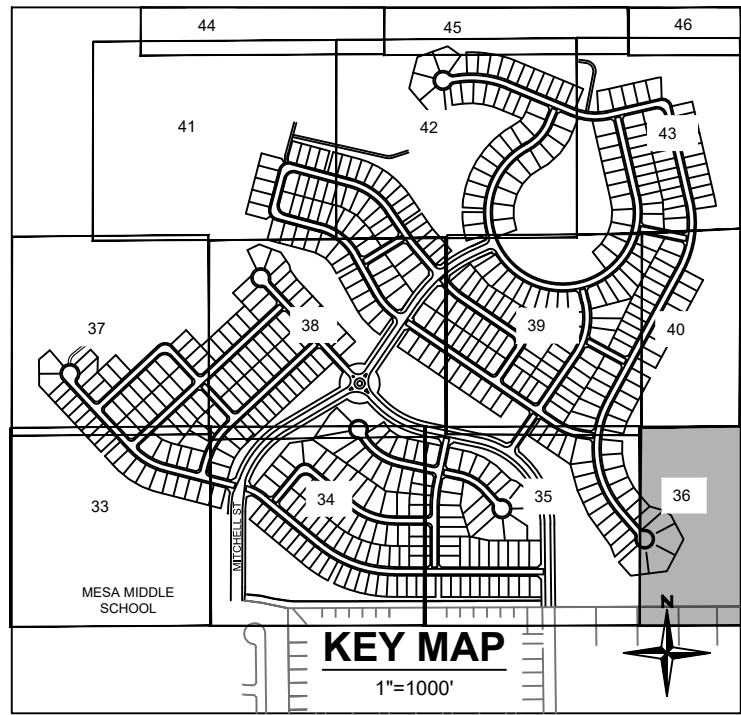
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SITE DEVELOPMENT PLAN
BELLA MESA NORTH

LOCATED IN THE PORTIONS OF THE SOUTHWEST QUARTER SECTION 4, THE SOUTHEAST QUARTER OF SECTION 5, THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 8, AND THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 9, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN AND A PORTION OF THE EAST HALF OF SECTION 6, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO.
TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

MATCHLINE - SEE SHEET 40 OF 87



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Landscape Architecture
Construction Management

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EXISTING LEGEND

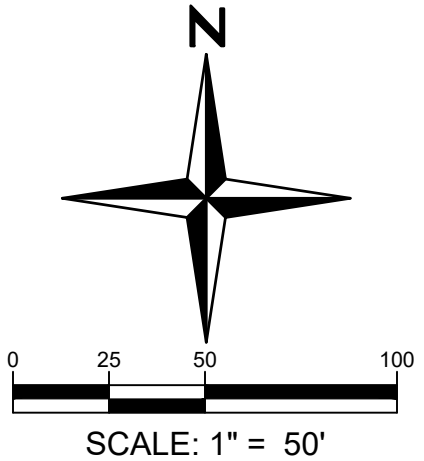
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	EXISTING R.O.W.
	EXISTING LOT LINE
	EXISTING EASEMENT
	SECTION LINE
	ROAD CENTERLINE
	EDGE OF PAVEMENT
	CURB AND GUTTER
	CONCRETE
	FENCE
	RETAINING WALL
	EXISTING WATERLINE
	EXISTING SANITARY SEWER
	EXISTING STORM SEWER
	EXISTING ELECTRIC LINE
	EXISTING GAS LINE
	EXISTING OVERHEAD ELECTRIC LINE

PROPOSED LEGEND

	PROPOSED PROPERTY LINE
	PROPOSED R.O.W.
	PROPOSED LOT LINE
	PROPOSED SETBACK
	PROPOSED EASEMENT
	PROPOSED ROAD CENTERLINE
	PROPOSED CURB AND GUTTER (CATCH)
	PROPOSED CURB AND GUTTER (SPILL)
	PROPOSED SIDEWALK
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	PROPOSED WATER TEE
	PROPOSED WATER REDUCER
	PROPOSED WATER VALVE
	PROPOSED FIRE HYDRANT
	PROPOSED PLUG/CAP
	PROPOSED RETAINING WALL
	TRACT BOUNDARY
	PROPOSED SWALE LINE
	UNDERDRAIN

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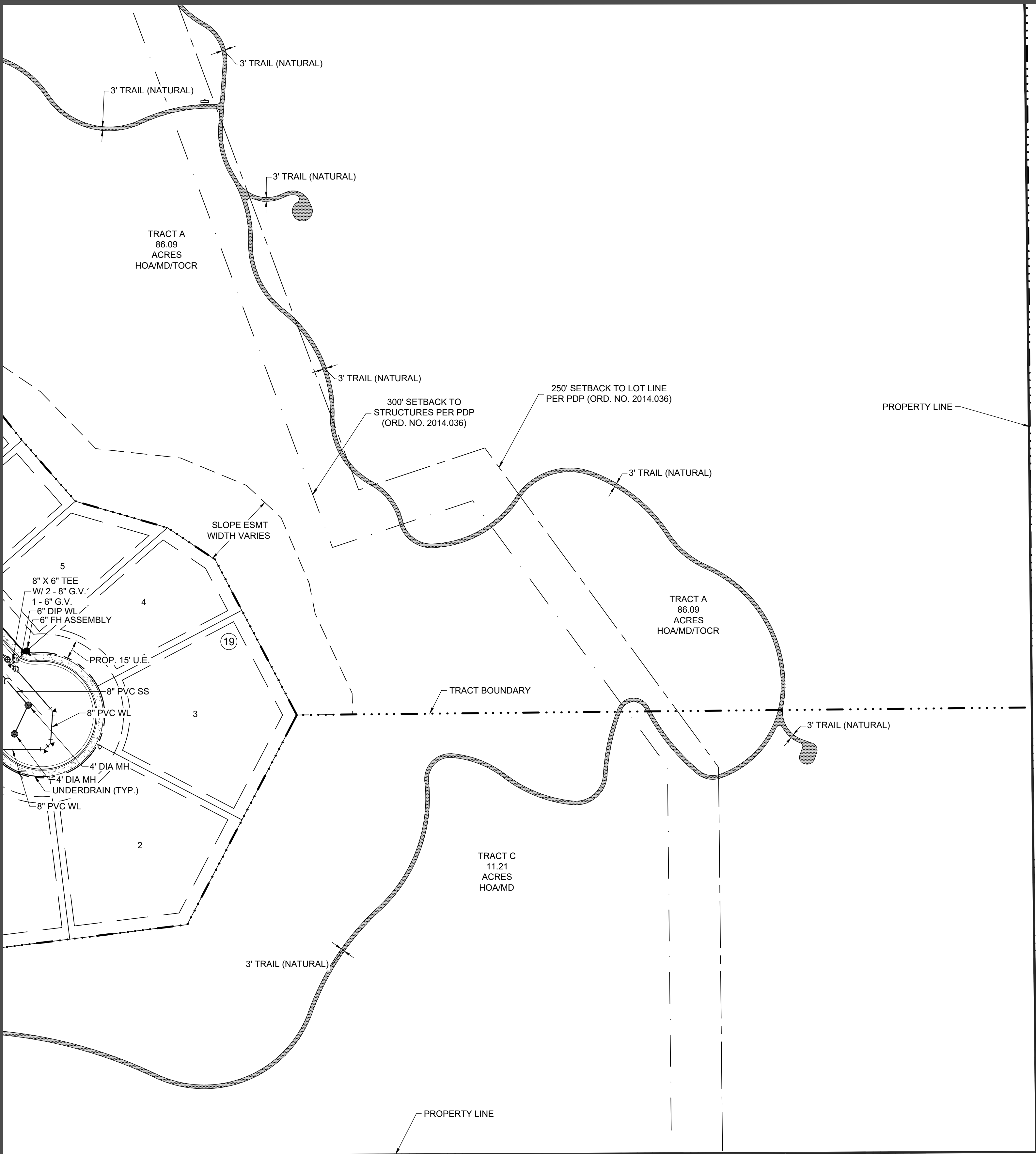


BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

SHEET

36 OF 87

MATCHLINE - SEE SHEET 35 OF 87



STEPHEN J SCHICKER &
SARAH M SCHICKER
CASTLEWOOD RANCH 2
PARCEL 11
REC. 2006091502
RESIDENTIAL

JAMES ALAN ROGERS &
RONDA CAROL ROGERS
CASTLEWOOD RANCH 2
PARCEL 11
REC. 2006091502
RESIDENTIAL

BRIAN T HANNIG &
PAULETTE Y HANNIG
CASTLEWOOD RANCH 2
PARCEL 11
REC. 2006091502
RESIDENTIAL

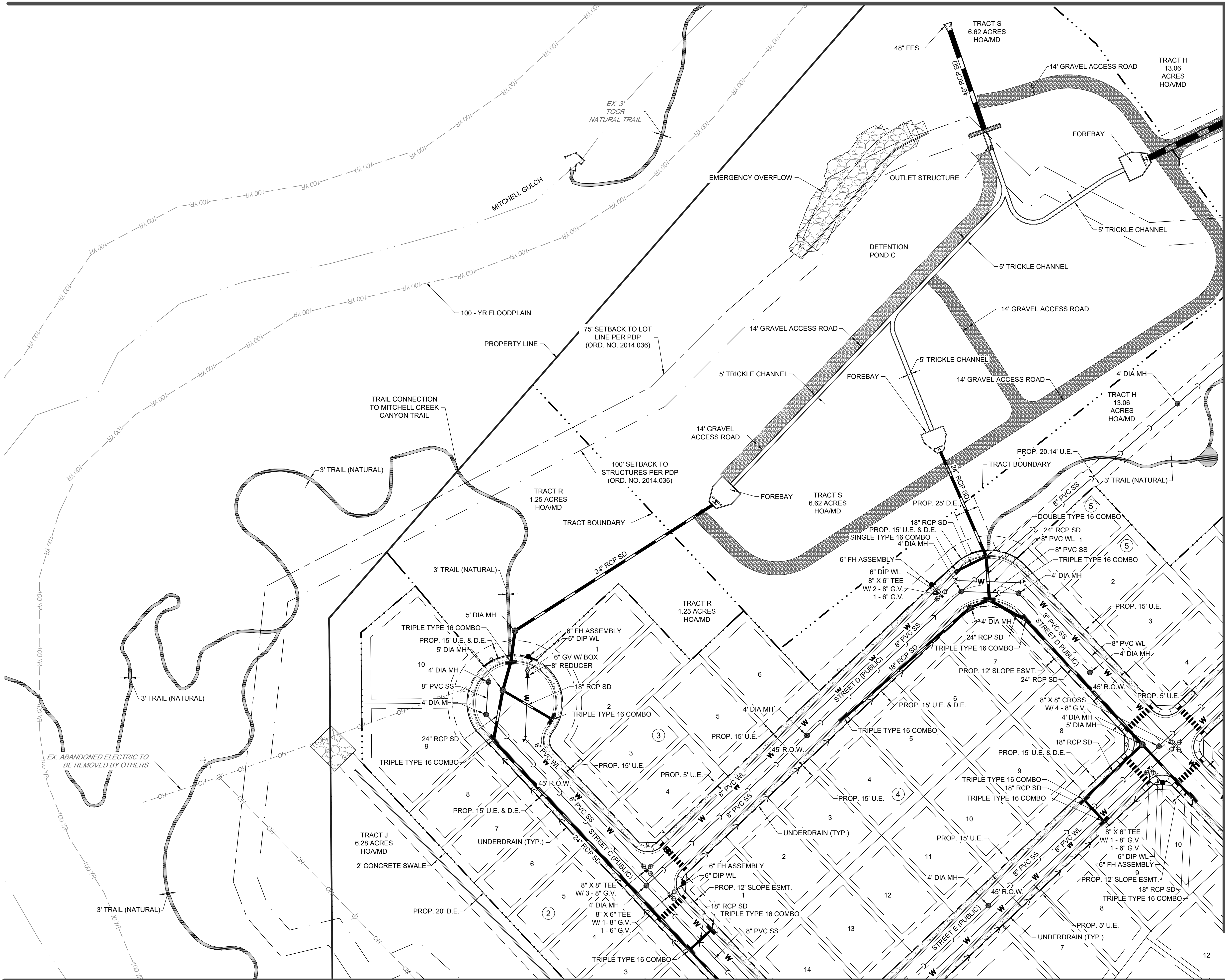
CASTLEWOOD RANCH
METRO DISTRICT
CASTLEWOOD RANCH 2
PARCEL 11
REC. 2006091502
RESIDENTIAL

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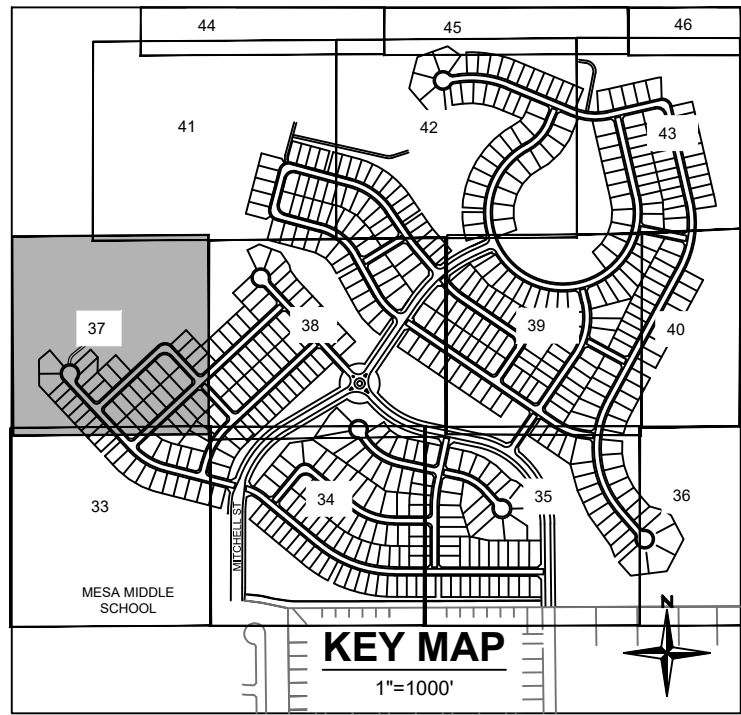
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BELLA MESA NORTH

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TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

MATCHLINE - SEE SHEET 41 OF 87



MATCHLINE - SEE SHEET 33 OF 87



EXISTING LEGEND

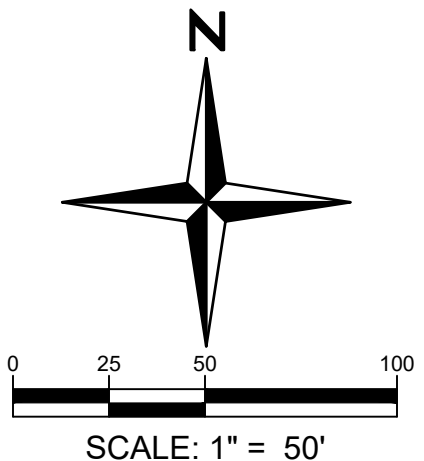
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- EXISTING R.O.W.
- EXISTING LOT LINE
- EXISTING EASEMENT
- SECTION LINE
- ROAD CENTERLINE
- EDGE OF PAVEMENT
- CURB AND GUTTER
- CONCRETE
- FENCE
- RETAINING WALL
- EXISTING WATERLINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING ELECTRIC LINE
- EXISTING GAS LINE
- EXISTING OVERHEAD ELECTRIC LINE

PROPOSED LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED R.O.W.
- PROPOSED LOT LINE
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED ROAD CENTERLINE
- PROPOSED CURB AND GUTTER (CATCH)
- PROPOSED CURB AND GUTTER (SPILL)
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- PROPOSED WATER LINE
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- PROPOSED SWALE LINE
- UNDERDRAIN

NOTES

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PROJECT NO.	DATE	NO.	NOTES
17026.004	12/05/2024	1	FIRST SUBMITTAL TO TOWN
	04/04/2025	2	SECOND SUBMITTAL TO TOWN
	06/27/2025	3	THIRD SUBMITTAL TO TOWN

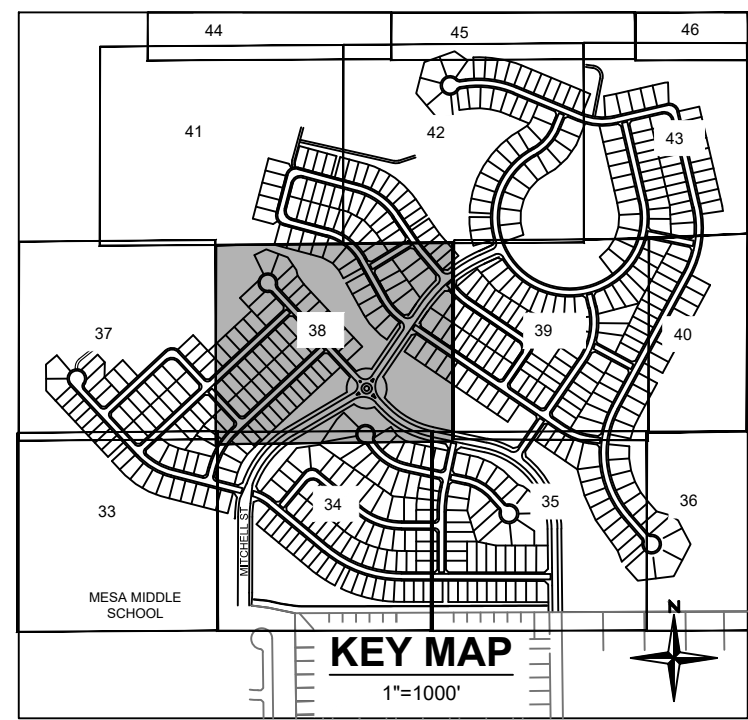
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TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

MATCHLINE - SEE SHEET 41 OF 87

MATCHLINE - SEE SHEET 42 OF 87



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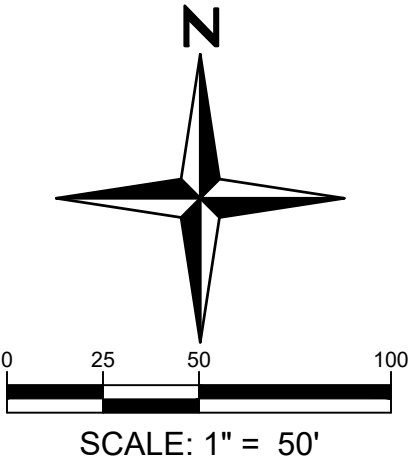
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BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

SHEET

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MATCHLINE - SEE SHEET 37 OF 87

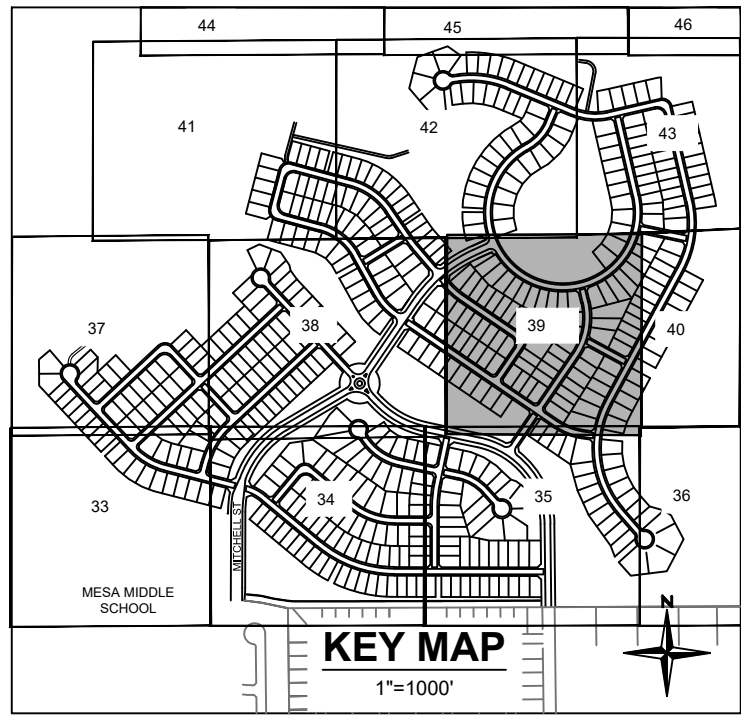
MATCHLINE - SEE SHEET 39 OF 87

MATCHLINE - SEE SHEET 34 OF 87

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SITE DEVELOPMENT PLAN
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TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040



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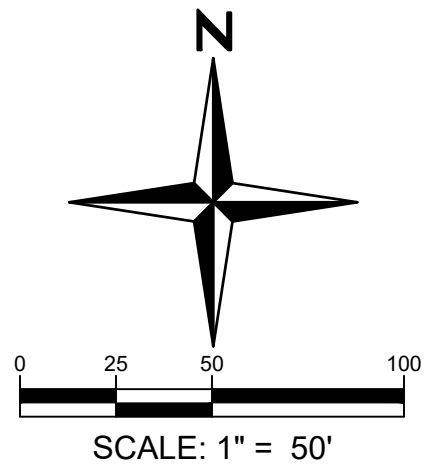
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UTILITY PLAN

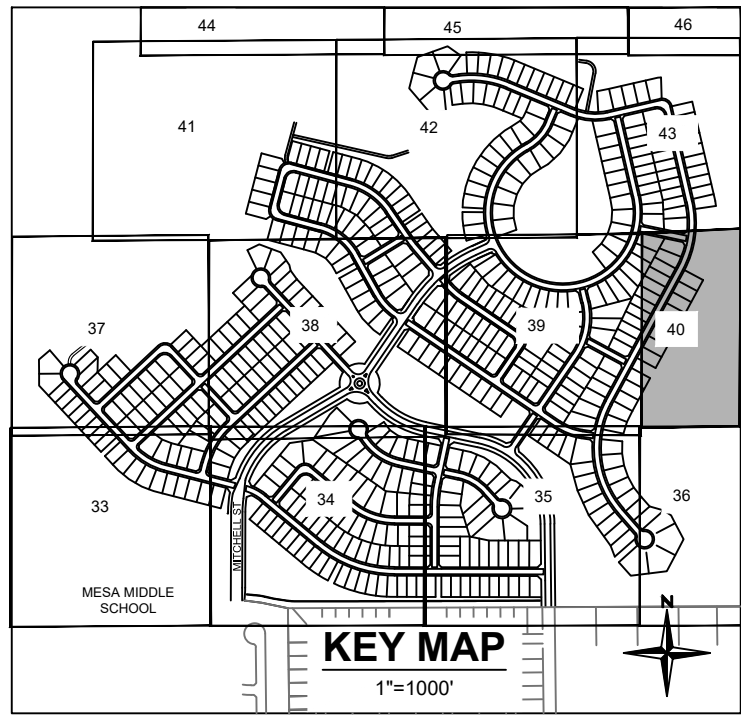
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CONSTRUCTION

EXISTING LEGEND

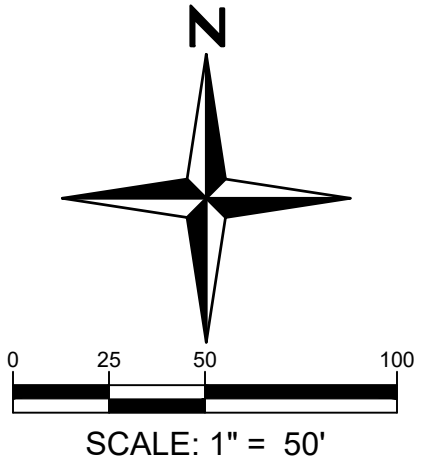
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- EXISTING R.O.W.
- EXISTING LOT LINE
- EXISTING EASEMENT
- SECTION LINE
- ROAD CENTERLINE
- EDGE OF PAVEMENT
- CURB AND GUTTER
- CONCRETE
- FENCE
- RETAINING WALL
- EXISTING WATERLINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING ELECTRIC LINE
- EXISTING GAS LINE
- EXISTING OVERHEAD ELECTRIC LINE

PROPOSED LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED R.O.W.
- PROPOSED LOT LINE
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED ROAD CENTERLINE
- PROPOSED CURB AND GUTTER (CATCH)
- PROPOSED CURB AND GUTTER (SPILL)
- PROPOSED SIDEWALK
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER LINE
- PROPOSED MANHOLE w/ DIA. (FT.)
- PROPOSED INLET
- PROPOSED FLARED END SECTION
- PROPOSED WATER BEND
- PROPOSED WATER CROSS
- PROPOSED WATER TEE
- PROPOSED WATER REDUCER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED PLUG/CAP
- PROPOSED RETAINING WALL
- TRACT BOUNDARY
- PROPOSED SWALE LINE
- UNDERDRAIN

NOTES

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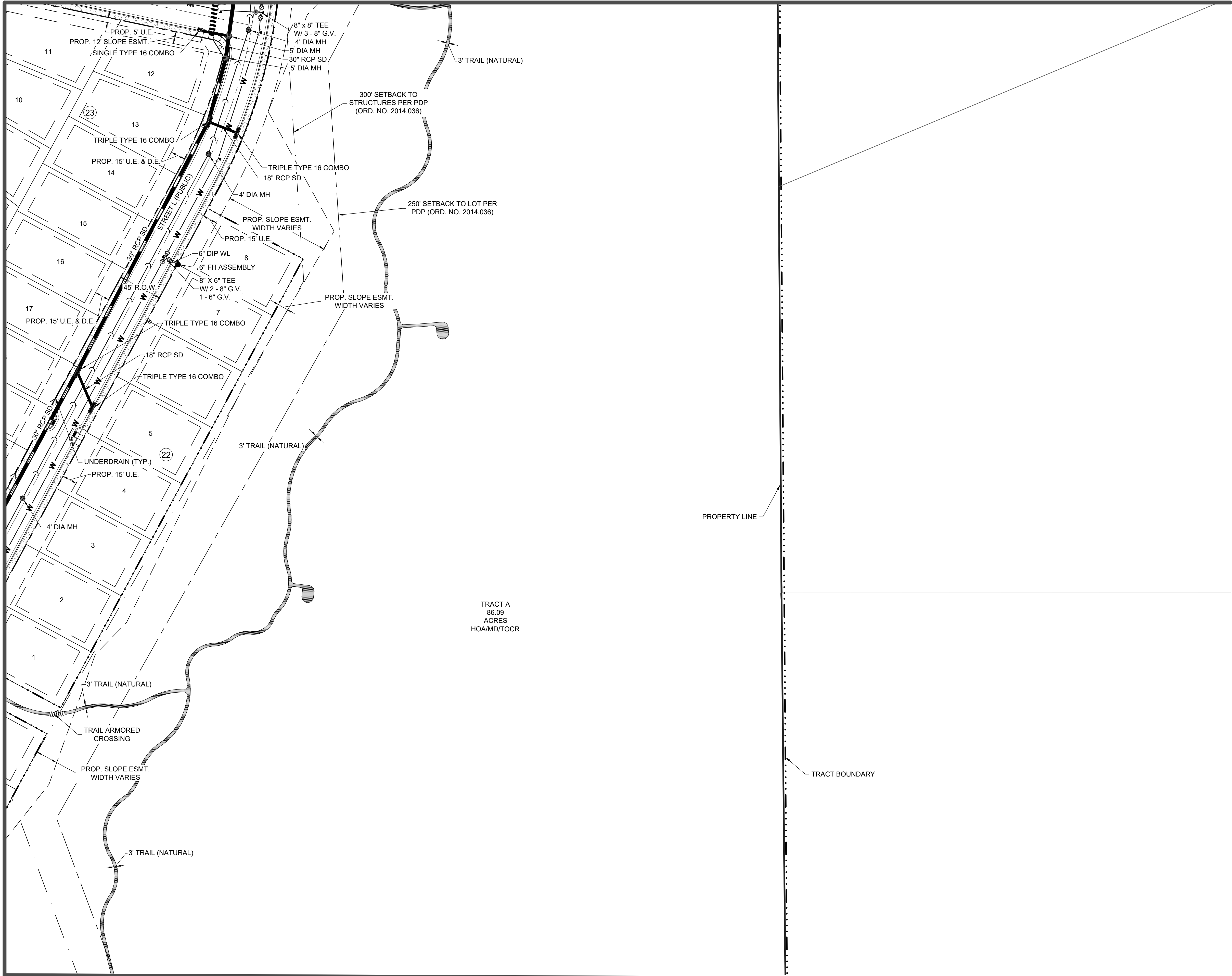
BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

SHEET

40 OF 87

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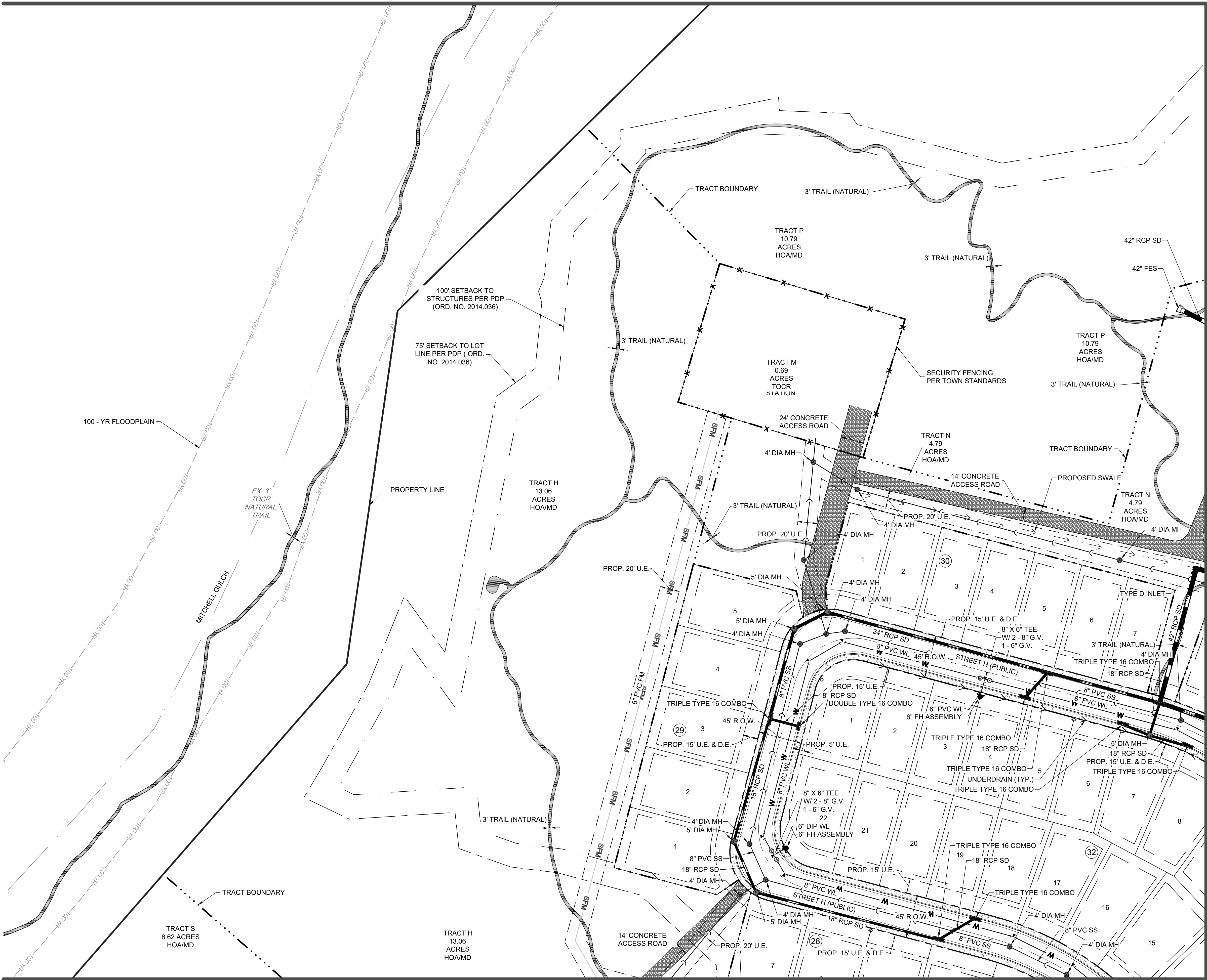


MATCHLINE - SEE SHEET 36 OF 87

SITE DEVELOPMENT PLAN
BELLA MESA NORTH

LOCATED IN THE PORTIONS OF THE SOUTHWEST QUARTER SECTION 4, THE SOUTHEAST QUARTER OF SECTION 5, THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 8, AND THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 9, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN AND A PORTION OF THE EAST HALF OF SECTION 6, TOWNSHIP 8 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO.
TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040

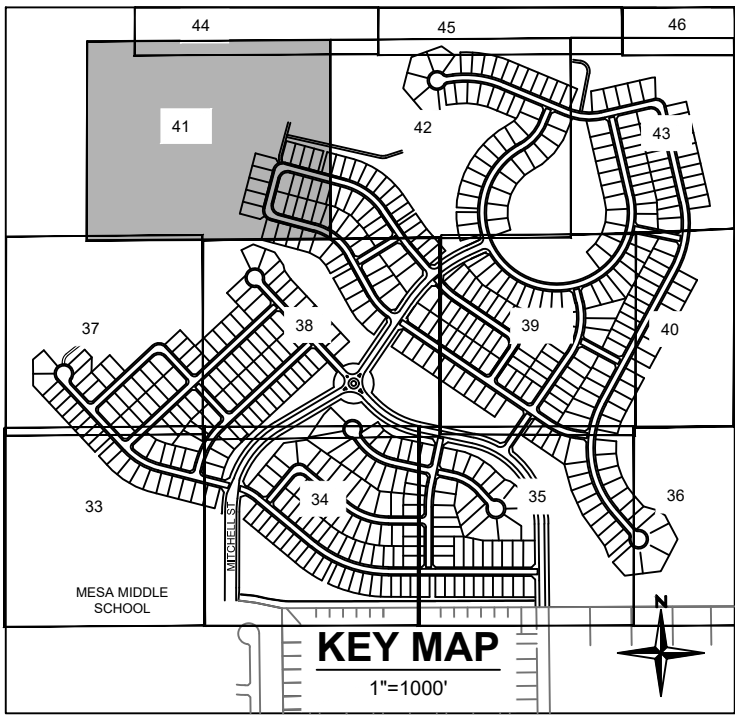
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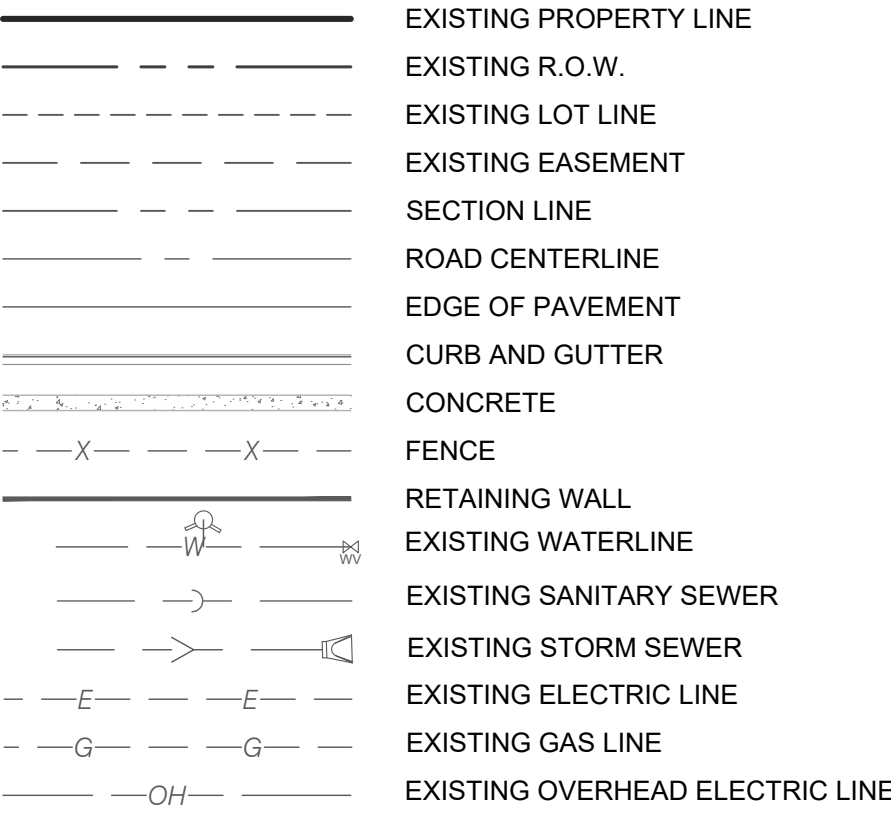
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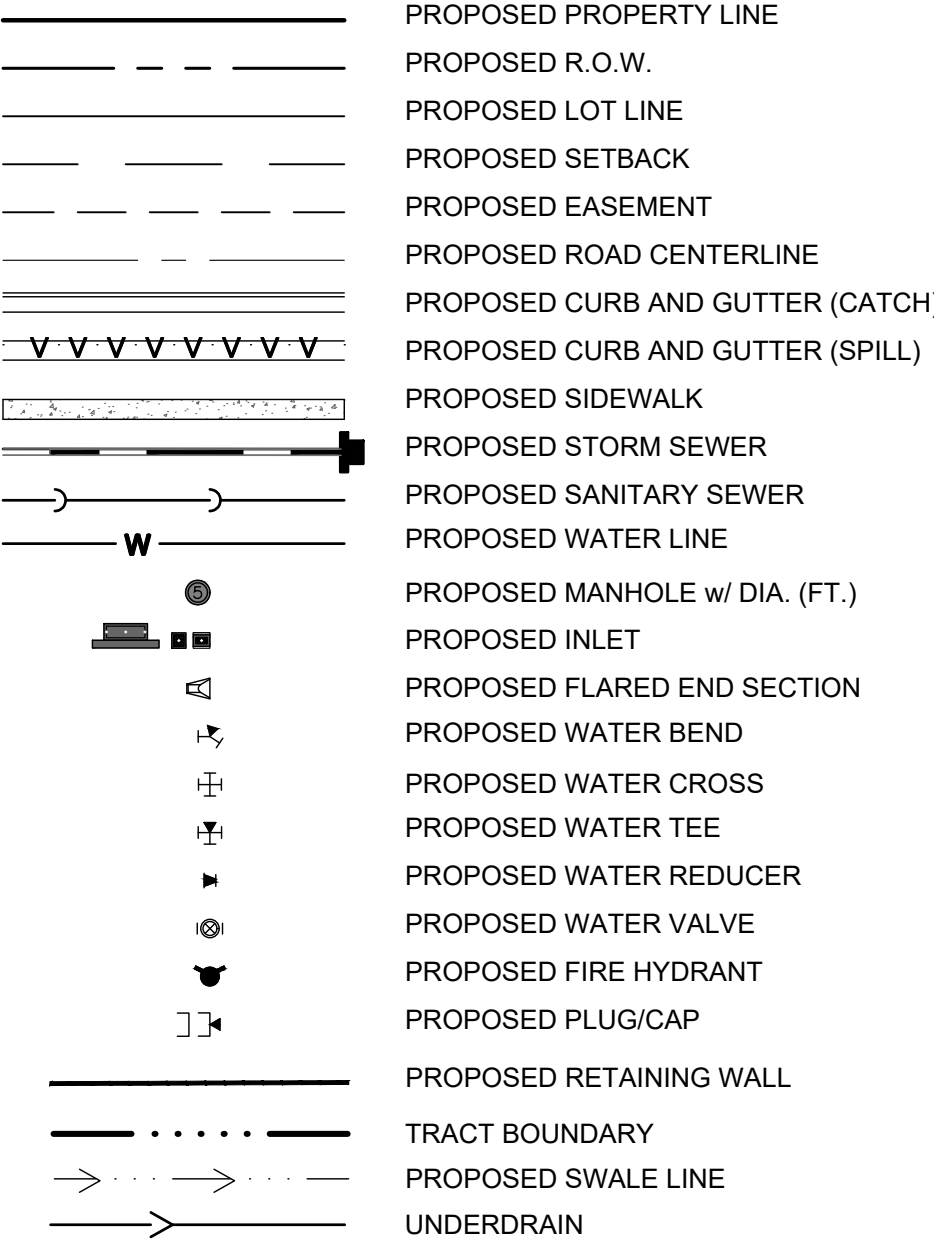
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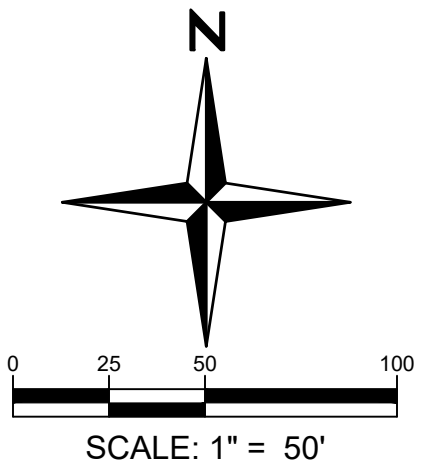


PROPOSED LEGEND



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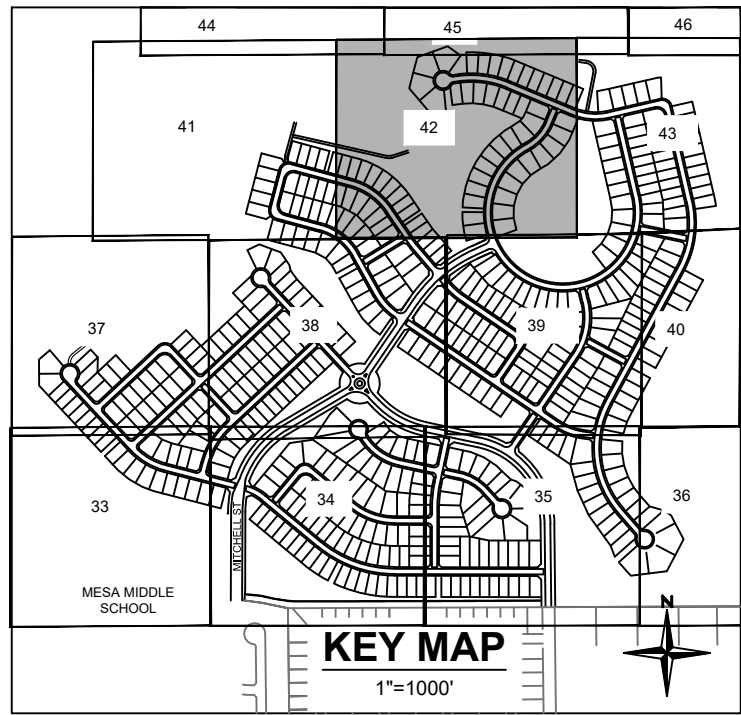
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PROJECT NO. 17026.004		DATE		NO.		NOTES	
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04/04/2025	2	SECOND SUBMITTAL TO TOWN					
06/27/2025	3	THIRD SUBMITTAL TO TOWN					

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BELLA MESA NORTH

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TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040



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EXISTING LEGEND

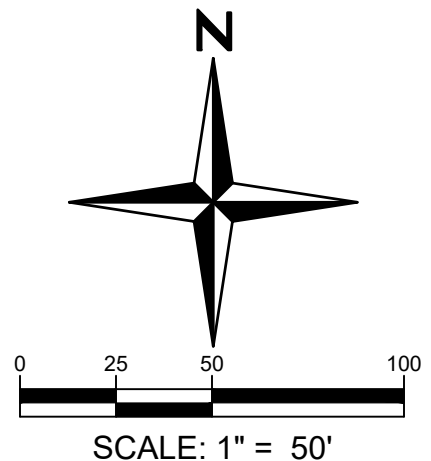
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- EXISTING LOT LINE
- EXISTING EASEMENT
- SECTION LINE
- ROAD CENTERLINE
- EDGE OF PAVEMENT
- CURB AND GUTTER
- CONCRETE
- FENCE
- RETAINING WALL
- EXISTING WATERLINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING ELECTRIC LINE
- EXISTING GAS LINE
- EXISTING OVERHEAD ELECTRIC LINE

PROPOSED LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED R.O.W.
- PROPOSED LOT LINE
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BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

SHEET

42 OF 87

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MATCHLINE - SEE SHEET 41 OF 87

MATCHLINE - SEE SHEET 43 OF 87

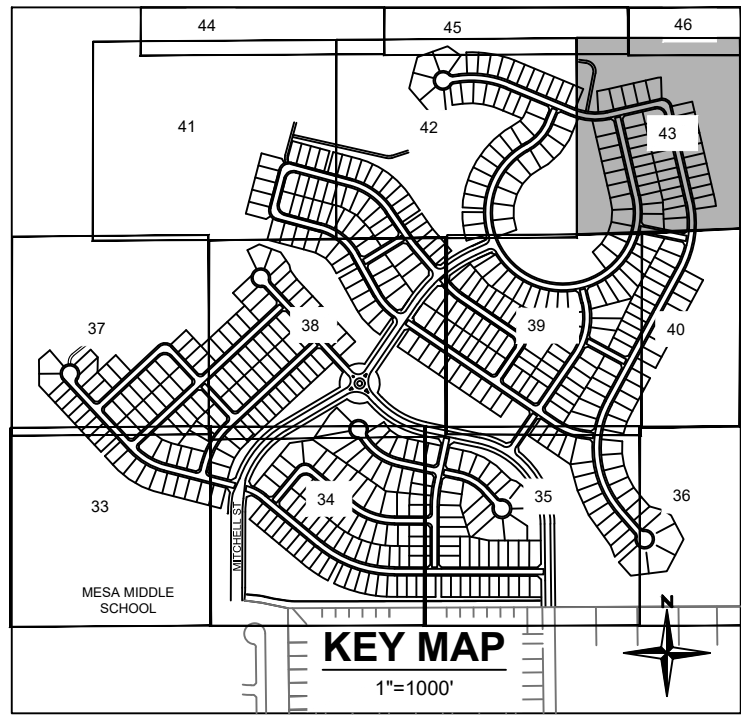
MATCHLINE - SEE SHEET 39 OF 87

MATCHLINE - SEE SHEET 38 OF 87

MATCHLINE - SEE SHEET 44 OF 87

SITE DEVELOPMENT PLAN
BELLA MESA NORTH

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NOTES	
NO.	DATE
1	12/05/2024
2	04/04/2025
3	09/27/2025

BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

SHEET
43 OF 87

EXISTING LEGEND

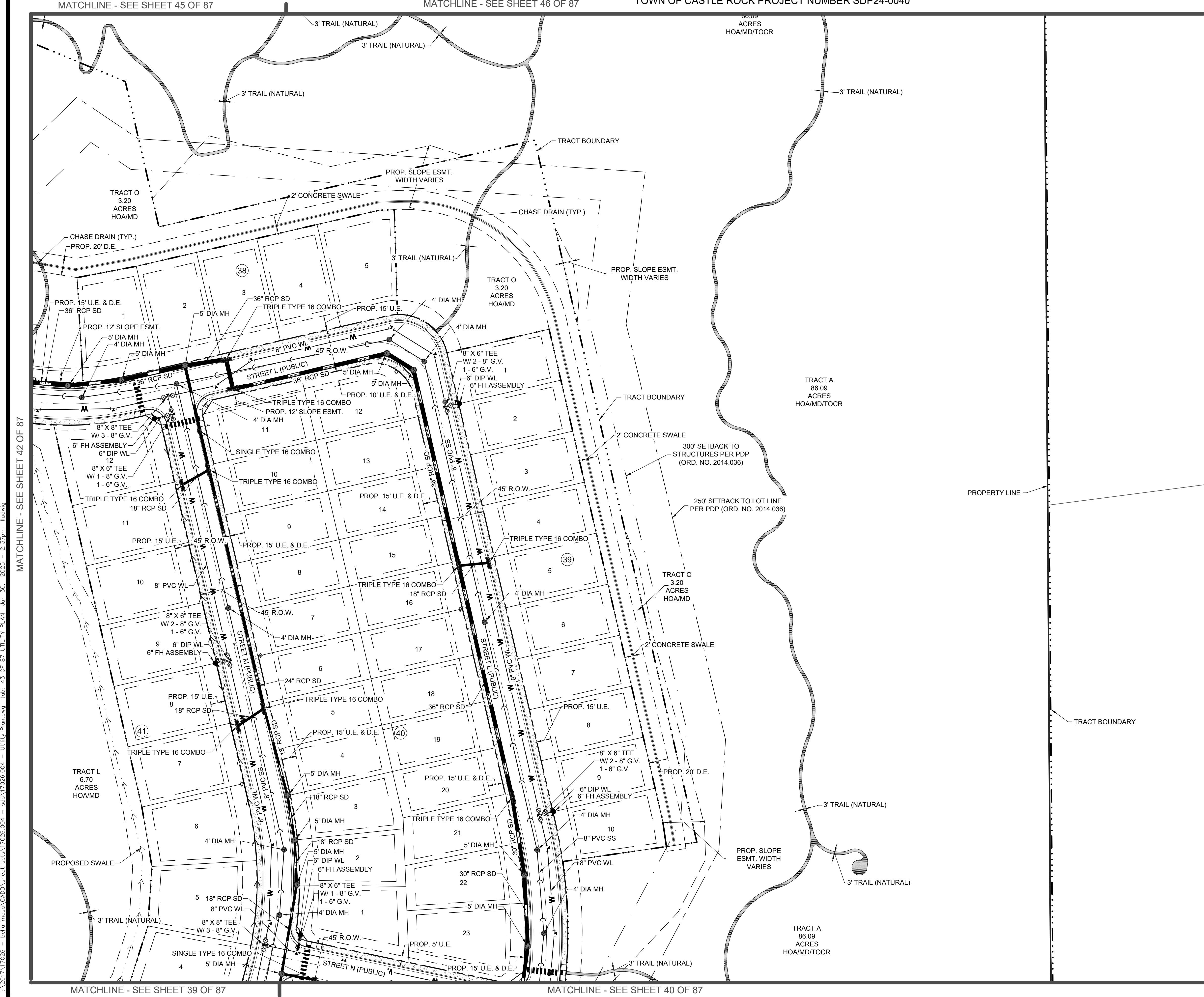
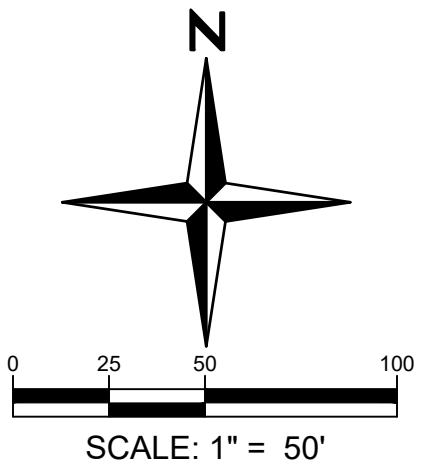
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PROPOSED LEGEND

	PROPOSED PROPERTY LINE
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	PROPOSED LOT LINE
	PROPOSED SETBACK
	PROPOSED EASEMENT
	PROPOSED ROAD CENTERLINE
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	PROPOSED SANITARY SEWER
	PROPOSED WATER LINE
	PROPOSED MANHOLE w/ DIA. (FT.)
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	PROPOSED FLARED END SECTION
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	PROPOSED WATER CROSS
	PROPOSED WATER TEE
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	PROPOSED WATER VALVE
	PROPOSED FIRE HYDRANT
	PROPOSED PLUG/CAP
	PROPOSED RETAINING WALL
	TRACT BOUNDARY
	PROPOSED SWALE LINE
	UNDERDRAIN

NOTES

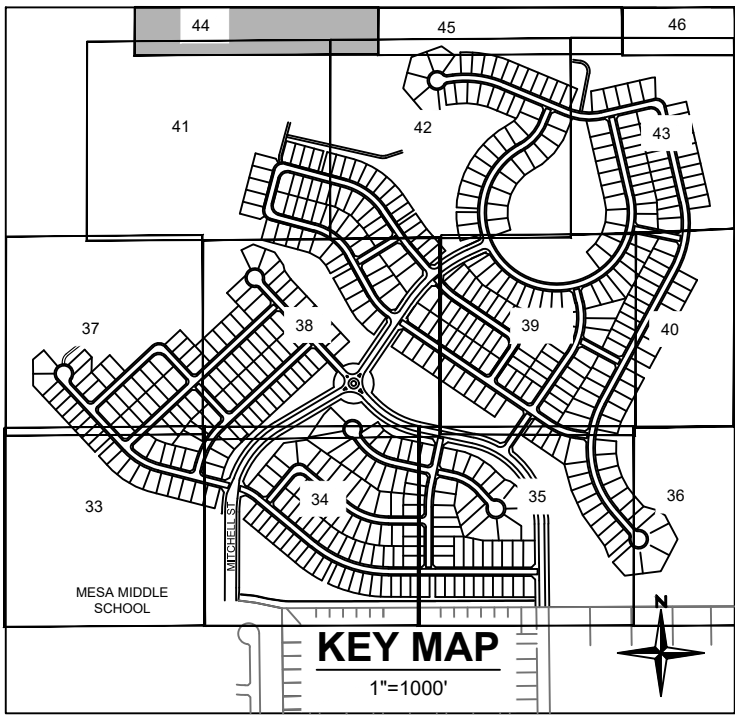
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SITE DEVELOPMENT PLAN
BELLA MESA NORTH

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TOWN OF CASTLE ROCK PROJECT NUMBER SDP24-0040



NOT FOR
CONSTRUCTION

PROJECT NO.	DATE	NO.	NOTES
17026.004			

DATE	NO.	NOTES
12/05/2024	1	FIRST SUBMITTAL TO TOWN
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BELLA MESA NORTH
SITE DEVELOPMENT PLAN
UTILITY PLAN

EXISTING LEGEND

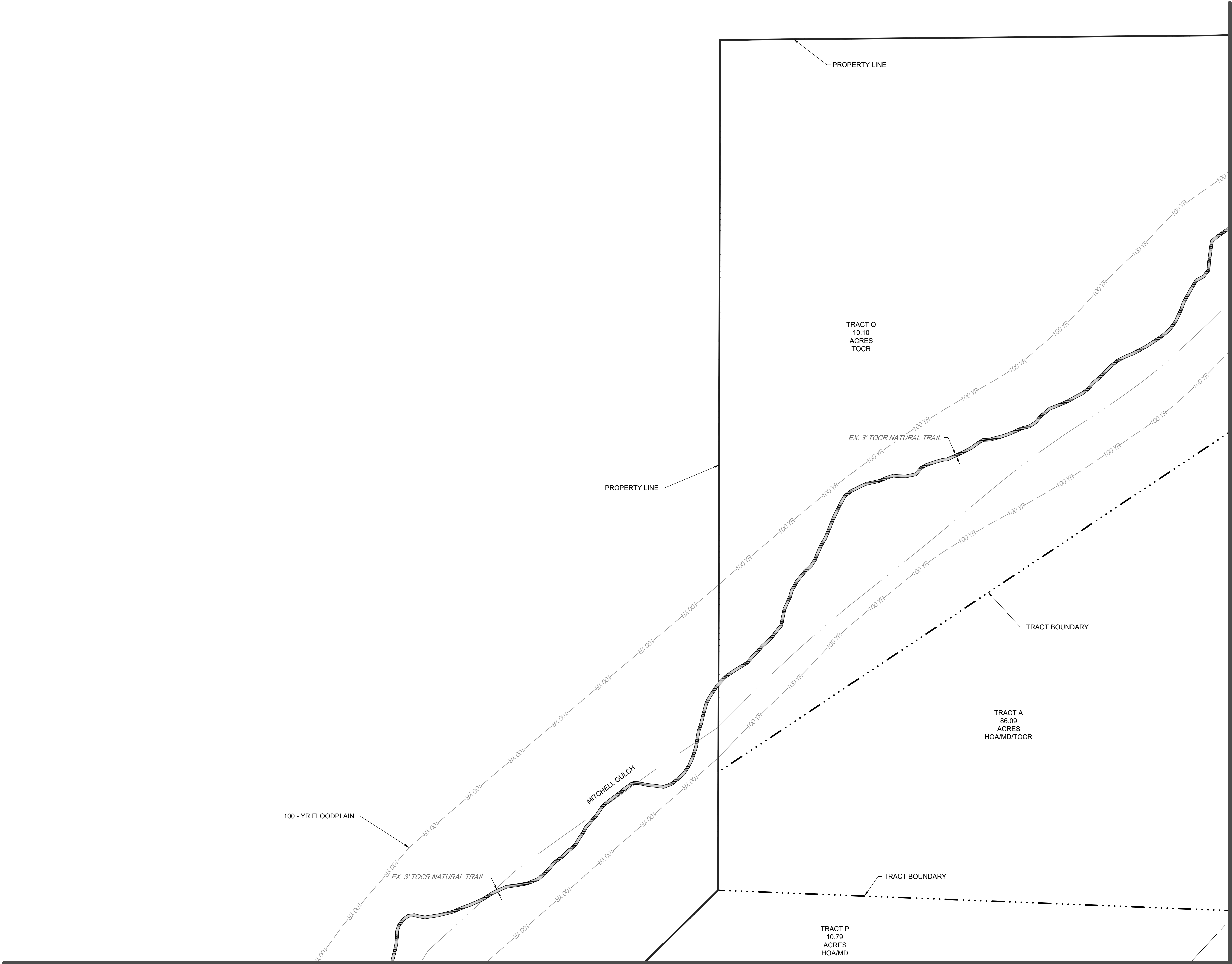
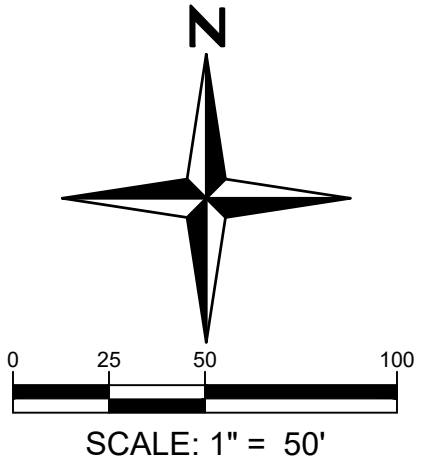
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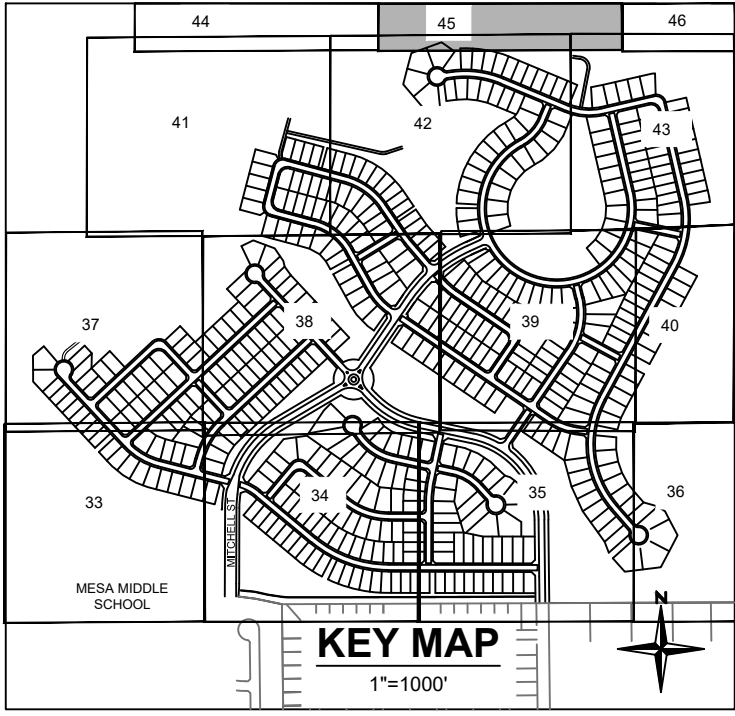
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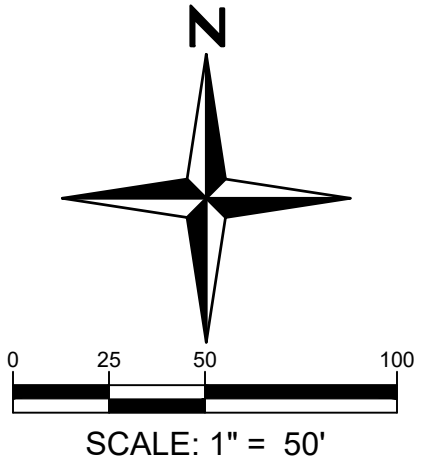
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SITE DEVELOPMENT PLAN
UTILITY PLAN

SHEET

45 OF 87

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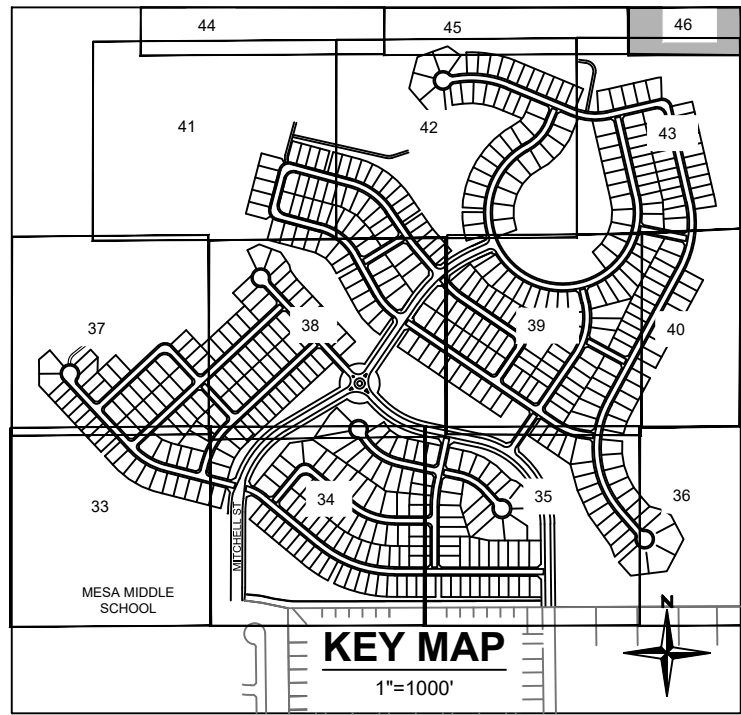
MATCHLINE - SEE SHEET 46 OF 87

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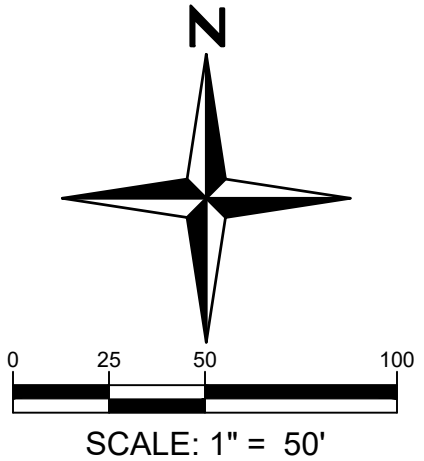
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MATCHLINE - SEE SHEET 43 OF 87

Appendix G – Water Budget Letter

MEMORANDUM

To: John V. Hill, Sara Dieringer, Bryan Conway

Prepared By: Mike Pietschmann, P.E.

Date: Revised, October 10, 2024

RE: Bella Mesa North and Bella Mesa South – Water Budget

Below is a breakdown of the approximate water demand/dedication requirements that may be needed for the Bella Mesa North (Sunset Point) project and Bella Mesa South (Founder's Village 24 West – townhomes) project. The below SFE amounts are subject to change based on the final unit count and the landscape/irrigation design that is selected for the projects as they progress during the design phase.

SFE Summary Table

Project Name or Description	SFE
Bella Mesa North	549
Bella Mesa South	60
Mickelson/Mitchell Roundabout	4
Total SFE's Needed for Bella Mesa	613
SFE Credit per Development Agreement	276.2
Remaining SFE Amount to Purchase	336.8

Bella Mesa North (293 acre Parcel) – Assumptions

- A total of 525 single-family detached lots are anticipated to be developed.
- A dedication of 1 SFE per single-family lot is required per Section 4.4.1 of the Town of Castle Rock's Water System Design Criteria Manual.
- The Landscape Summary Table on Sheet 38 of 88 of the Sunset Point SDP prepared by Norris Design, dated 07/15/2022 was used for determining the irrigated landscape area for all common area open space tracts on the project.
- The only change we made from the Landscape Summary Table was to increase the "Turf (Texas Hybrid Bluegrass)" from 12,402 SF (0.28 acres) to 65,340 SF (1.5 acres). A total of 0.28 acres of turf area for 525 lots seems slightly low. By adding 1.22 acres of additional turf area, it increased the total annual water demand requirement by 3.3 acre-feet.
- Denver Water's published spreadsheet was used for determining the approximate water budget (acre-feet) based on the 3 types of plantings (turf, native, shrubs & tree beds) shown on the SDP.
- We assumed seven 1-1/2" irrigation taps for the Bella Mesa North project. This is extremely conceptual as no design has been completed on the irrigation system by any

consultant to date. More accurate size and number of irrigation taps will be determined as design progresses. This was used to determine the approximate number of SFE's needed per Castle Rock Water's system development fees. We are currently confirming with Castle Rock that the SFE's shown on their system development table is what they will require for each irrigation tap size.

Bella Mesa North (293 acre Parcel) – Water Dedication Requirements

- A total of 525 Single-Family Equivalent's (SFE's) will be required to serve the 525 lots anticipated for the Bella Mesa North project.
- Based on the conceptual landscape plans prepared by others and Denver Water's spreadsheet, a total of approximately 24.2 acre-feet of water will be required for irrigation. This may increase or decrease as Redland coordinates and prepares the landscape & irrigation plans for Cardel Homes.
- Using the assumption of seven 1-1/2" taps, this would equate to approximately 23.31 SFE's for irrigation taps per the Town's system development fee table.
- Therefore, the total amount of SFE's need to serve both on lot and irrigated common area open space for the Bella Mesa North project is approximately 549 SFE's.

Bella Mesa South (9 acre Parcel) – Assumptions

- The PD allows for a maximum of 196 multi-family units for the Bella Mesa South parcel. The most current conceptual site plan for the parcel yields approximately 82 units, which is what we assumed for the below calculations.
- A dedication of 0.65 SFE per townhome lot is required per Section 4.4.1 of the Town of Castle Rock's Water System Design Criteria Manual.
- The Landscape Summary Table on Sheet 8 of 16 of the Avilla Founders Village SDP prepared by Norris Design, dated 12/02/2021 for the site (NexMetro's submittal) was used for determining the irrigated landscape area for all common area open space tracts on the project.
- Denver Water's published spreadsheet was used for determining the approximate water dedication requirement (acre-feet) based on the 3 types of plantings (turf, native, shrubs & tree beds) shown.
- We assumed one 2" irrigation tap for the project. This is extremely conceptual as no design has been complete on the irrigation system by any consultant to date. More accurate size and number of irrigation taps will be determined as design progresses. This was used to determine the approximate number of SFE's needed per Castle Rock Water's system development fees. We are currently confirming with Castle Rock that SFE's shown on their system development table is what they will require for each irrigation tap size.

Bella Mesa South (9 acre Parcel) – Water Dedication Requirements

- A total of 82 townhome lots was assumed based on the current conceptual site plan. This would equate to the need for an additional 53.3 SFE's. If you were able to achieve the maximum density of 196 units, which is not feasible for a townhome product on this parcel, this would equate to 127.4 SFE's.
- Based on the conceptual landscape plans prepared by others and Denver Water's spreadsheet, a total of approximately 4.5 acre-feet of water will be required for

irrigation. This may increase or decrease as Redland coordinates and prepares the landscape plans for Cardel Homes.

- Using the assumption of one 2" tap as stated above, this would equate to approximately 6.67 SFE's for the irrigation tap per the Town's system development fee table.
- Therefore, the total amount of SFE's need to serve both on lot and irrigated common area open space for the Bella Mesa South project is approximately 60 SFE's. This would increase if more than 82 townhome lots are able to be achieved.

Overall Summary

Based on the above assumptions and information, we estimate the minimum number of Single-Family Equivalent's (SFE's) necessary to develop the Bella Mesa North and South parcels are:

- Bella Mesa North – 549 SFE's: This includes 525 SFE's for the water taps to each lot, and approximately an additional 23.31 SFE's for the irrigation taps serving the common area open space tracts.
- Bella Mesa South – 60 SFE's: This includes 53.3 SFE's for the water taps to each lot, and approximately an additional 6.67 SFE's for the irrigation taps serving the common area open space tracts.
- Mitchell & Mikelson Right-of-Ways – approximately 4.0 SFE's will be necessary for the Mickelson & Mitchell right-of-ways for landscape irrigation purposes. This is based on a 1-1/2" irrigation tap being needed to serve this area.

This equates to a minimum of 613 SFE's suggested to be available for the project based on the level of design completed to date. It should also be noted that the project currently has a credit of 276.2 SFE's available to it as outlined in the approved development agreement. Therefore, approximately an additional 336.8 SFE's remain to be acquired in order to adequately serve the project.

Please note the above is approximate and may be subject to change based on the final number of lots and type/amount of landscaping chosen for the development.

WATER BUDGET											
PROJECT NAME:		Bella Mesa North- Approximate Landscape Water Budget					SUBMITTED BY:			DATE: 9/23/2024	
TAP SIZE:											
TAP ELEVATION:											
ADDRESS:											
LEGAL DESCRIPTION:											
DESCRIPTION	IRRIGATED ACRES	MONTH	HISTORICAL ET	PLANT COEFFICIENT(Kc)	PLANT WATER REQUIREMENT	AVERAGE PRECIPITATION	EFFECTIVE PRECIPITATION	SYSTEM EFFICIENCIES	TOTAL WATER REQUIREMENT(IN.)	WEEKLY WATER REQUIREMENT (IN.)	MONTHLY WATER REQUIREMENT (IN.)
PLANT TYPE:	1.50	APRIL	2.26	0.88	1.99	0	0.00	90%	2.21	0.51	89,520
BLUEGRASS		MAY	5.73	0.88	5.04	0	0.00	90%	5.60	1.29	226,969
		JUNE	6.64	0.88	5.84	0	0.00	90%	6.49	1.50	263,014
		JULY	7.27	0.88	6.40	0	0.00	90%	7.11	1.64	287,969
		AUGUST	5.87	0.88	5.17	0	0.00	90%	5.74	1.32	232,514
		SEPTEMBER	4.45	0.88	3.92	0	0.00	90%	4.35	1.00	176,267
		OCTOBER	1.6	0.88	1.41	0	0.00	90%	1.56	0.36	63,377
		TOTALS	33.82			29.76	0	0.00	TOTAL	33.07	TOTAL
OPERATING PERIOD-HRS./DAY	8.0										4.1
DAYS/WEEK	6.0										23
DAYS/MONTH	26.0										
DESCRIPTION	IRRIGATED ACRES	MONTH	HISTORICAL ET	PLANT COEFFICIENT	PLANT WATER REQUIREMENT	AVE. RAINFALL	EFFECTIVE RAINFALL	SYSTEM EFFICIENCIES	TOTAL WATER REQUIREMENT(IN.)	WEEKLY WATER REQUIREMENT (IN.)	MONTHLY WATER REQUIREMENT (IN.)
PLANT TYPE:	1.00	APRIL	2.26	0.5	1.13	0	0.00	90%	1.26	0.29	33,909
MODERATE USE TREES & SHRUBS		MAY	5.73	0.5	2.87	0	0.00	90%	3.18	0.73	85,973
		JUNE	6.64	0.5	3.32	0	0.00	90%	3.69	0.85	99,627
		JULY	7.27	0.5	3.64	0	0.00	90%	4.04	0.93	109,079
		AUGUST	5.87	0.5	2.94	0	0.00	90%	3.26	0.75	88,073
		SEPTEMBER	4.45	0.5	2.23	0	0.00	90%	2.47	0.57	66,768
		OCTOBER	1.6	0.5	0.80	0	0.00	90%	0.89	0.21	24,006
		TOTALS	33.82			16.91	0	0.00	TOTAL	18.79	TOTAL
OPERATING PERIOD-HRS./DAY	8.0										1.6
DAYS/WEEK	6.0										9
DAYS/MONTH	26.0										
DESCRIPTION	IRRIGATED ACRES	MONTH	HISTORICAL ET	PLANT COEFFICIENT	PLANT WATER REQUIREMENT	AVE. RAINFALL	EFFECTIVE RAINFALL	SYSTEM EFFICIENCIES	TOTAL WATER REQUIREMENT(IN.)	WEEKLY WATER REQUIREMENT (IN.)	MONTHLY WATER REQUIREMENT (IN.)
PLANT TYPE:	15.46	APRIL	2.26	0.3	0.68	0	0.00	70%	0.97	0.22	404,409
NATIVE GRASS		MAY	5.73	0.3	1.72	0	0.00	70%	2.46	0.57	1,025,338
		JUNE	6.64	0.3	1.99	0	0.00	70%	2.85	0.66	1,188,175
		JULY	7.27	0.3	2.18	0	0.00	70%	3.12	0.72	1,300,908
		AUGUST	5.87	0.3	1.76	0	0.00	70%	2.52	0.58	1,050,389
		SEPTEMBER	4.45	0.3	1.34	0	0.00	70%	1.91	0.44	796,292
		OCTOBER	1.6	0.3	0.48	0	0.00	70%	0.69	0.16	286,307
		TOTALS	33.82			10.15	0	0.00	TOTAL	14.49	TOTAL
OPERATING PERIOD-HRS./DAY	8.0										18.6
DAYS/WEEK	6.0										105
DAYS/MONTH	26.0										
MINIMUM REQUIRED SYSTEM EFFICIENCIES:										PROJECT TOTALS	
Drip irrigation - 90%										IRRIGATED ACRES	
Rotor irrigation - 70%										GALLONS/YEAR	
Spray head irrigation: 65%										ACRE FEET/YEAR	
April & October ET = 1/2 Monthly Value										PEAK SEASON GPM	
ET data from Denver Water weather stations (Average 2003-2008)											
										18.0	
										7,898,883	
										24.2	
										137	

WATER BUDGET											
PROJECT NAME:		Bella Mesa South - Approximate Landscape Water Budget					SUBMITTED BY:			DATE: 9/23/2024	
TAP SIZE:											
TAP ELEVATION:											
ADDRESS:											
LEGAL DESCRIPTION:											

Appendix H – Lift Station Report

1st Water & Sanitation
Review
Mimi Short, P.E.
303-663-4456

John Chrestensen
Field Services
Superintendent (pop-up
notes)

SUNSET POINT LIFT STATION

PRELIMINARY ENGINEERING REPORT

SDP22-0006

This report should be an attachment (appendix) to the Preliminary Utility Report. A more thorough review will be performed at the time of the CD submittal.

PREPARED FOR:

THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WATER QUALITY CONTROL DIVISION
4300 Cherry Creek Drive South
Denver, CO 80246-1530

ON BEHALF OF:

DR HORTON

Issue Date: August 10, 2022

PREPARED BY:



MSK Consulting, LLC
7157 S. Andes Circle
Centennial, CO 80016

MSK Project No. 25-001-01

This document was prepared either by me or under my direct supervision. I am a registered professional engineer in the State of Colorado and am in good standing with the Board of Registered Professional Engineers and Land Surveyors.



David L. Takeda
Colorado P.E. #34757

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APPENDICES

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Appendix B: Castle Rock Water Design Criteria and Calculations
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SECTION 1: INTRODUCTION

1.1 LOCATION

The proposed Sunset Point Lift Station will be located in the Sunset Point development in the Town of Castle Rock, Douglas County, state of Colorado. Sunset Point is a 293-acre development that offers single-family residential units. The proposed Sunset Point Lift Station lies in SE quarter of Section 5, Township 8 South, Range 66 West of the 6th Principal Meridian.

The service area is undeveloped and the proposed lift station will serve the entire Sunset Point subdivision. The proposed facility will be situated approximately 4,900 feet to the intersection the Mikelson Blvd and Mitchell Street.



FIGURE 1-1: SUNSET POINT LOCATION MAP
(NOT TO SCALE)

1.2 BACKGROUND

At build-out the Sunset Point development will contain approximately 525 single-family homes. The development has Mitchell Gulch on its western boundary, which impedes gravity flow to the existing sewer collection system to the west. Ultimately, the development's wastewater will be treated at the existing Plum Creek Water Reclamation Facility (PCWRF), which is owned and operated by the Plum Creek Water Reclamation Authority (PCWRA). The existing treatment plant is approximately 6.5 miles to the northwest of the development and is separated by ridgelines, valleys, Interstate 25, creeks, and existing development.

Consequently, all of the wastewater from Sunset Point will require a lift station to deliver the flows to the existing sanitary sewer collection system. Presently, the plan is to pump the raw sewage south to an existing 8-inch sewer line. This sewer line will gravity flow to an existing syphon that crosses Mitchell Gulch. The existing syphon discharges into an existing sewer, which flows to the existing Mitchell Creek Lift Station. The Mitchell Creek Lift Station's force main discharges into an existing gravity system that ultimately continues to the PCWRF located on Highway 85. All of the existing sanitary sewer collection system, but not the PCWRF, is owned and operated by the Castle Rock Water (CRW).

The proposed Sunset Point Lift Station will be situated on the east side of Mitchell Gulch at the downstream (northwestern) end of the Sunset Point development. The proposed site and its overflow pond will be outside of the 100-year floodplain. The accompanying force main's alignment is to the south approximately 5,125 lineal feet (lf) to an existing outfall manhole in N. Mitchell Street. After construction and final acceptance, the proposed Sunset Point Lift Station will be owned and operated by Castle Rock Water (CRW).

1.3 APPLICANT INFORMATION

1.3.1 Applicant

The Applicant for the Sunset Point Lift Station is:

DR Horton
9555 S. Kingston Ct.
Englewood, CO 80112
303-503-4903
Attn: Riley Hillen, Forward Planner

1.3.2 Owner/Operator

The owner and operator for the Sunset Point Lift Station is:

Castle Rock Water
175 Kellogg Court
Castle Rock, CO 80109
720-773-6033

1.3.3 Treater

The wastewater pumped by the Sunset Point Lift Station will be treated by:

Plum Creek Water Reclamation Authority
4255 US Highway 85
Castle Rock, CO 80108
303-688-1991
Attn: Wes Martin, Manager

1.3.4 Engineer

The Engineer for the Sunset Point Lift Station is:

MSK Consulting, LLC
7157 S. Andes Circle
Centennial, CO 80016
303-903-0918
dave@mskwater.com
Attn: David L. Takeda, P.E., Owner

SECTION 2: EXISTING FACILITIES

2.1 SERVICE AREA

The service area for the proposed lift station is shown in Figure 2-1 and contains approximately 293 acres. Using the CRW's design criteria, the proposed Sunset Point development contains 525 single-family equivalents ("SFE"). One SFE produces the same amount of wastewater as the average single-family home.

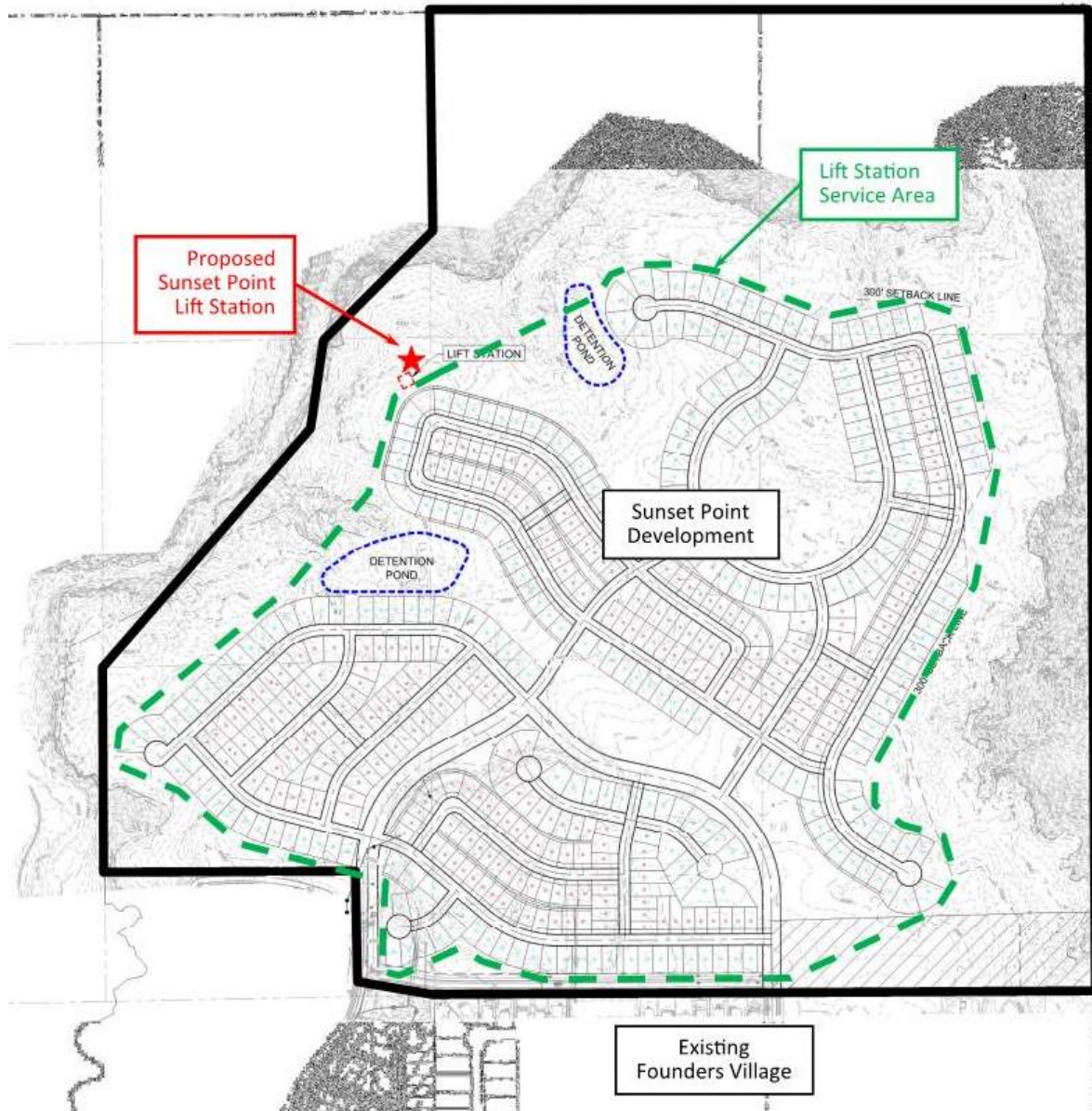


FIGURE 2-1: LIFT STATION SERVICE AREA
(NOT TO SCALE)

Table 2-1: Sunset Point Lift Station Ultimate SFEs

Type	Quantity	SFEs
Residential (single-family)	525 units	525
Totals		525

2.2 EXISTING WASTEWATER SYSTEM

2.2.1 Existing Collection System

The existing FM in Mitchell Street is required to be assessed by video and pressure testing to verify operational integrity.

An existing 6-inch force main is installed in Mitchell Street and starts at the southern boundary of Sunset Point. This force main is currently not in service and was installed previously in anticipation of the proposed lift station. The existing force main connects to an existing 8-inch sewer line at the intersection of Mitchell Street and Vista Canyon Drive. This existing sewer line discharges into an existing 8-inch syphon that crosses Mitchell Gulch and then flows into an existing 8-inch sewer line. This sewer line discharges into the existing Mitchell Creek Lift Station.

2.2.2 Existing Lift Stations

CRW operates one lift station that is downstream of the proposed Sunset Point Lift Station. The Mitchell Creek Lift Station was installed in 2003 and has a rated capacity of 1,450 gpm. The existing Mitchell Creek Lift Station was designed to serve the flows from Sunset Point and an expansion to this facility is not required.

2.2.3 Existing Wastewater Treatment Plant

All wastewater from CRW is treated at the PCWRF. The existing facility has a permitted hydraulic capacity of 6.44 mgd and the current hydraulic loading is approximately 5.3 mgd. The PCWRF's processes include primary screening, grit removal, oxidation ditches, secondary clarifiers, filtration, UV disinfection, and sludge dewatering. The PCWRF will not require an expansion or modifications to its existing treatment processes in order to receive and treat wastewater from the proposed Sunset Point Lift Station.

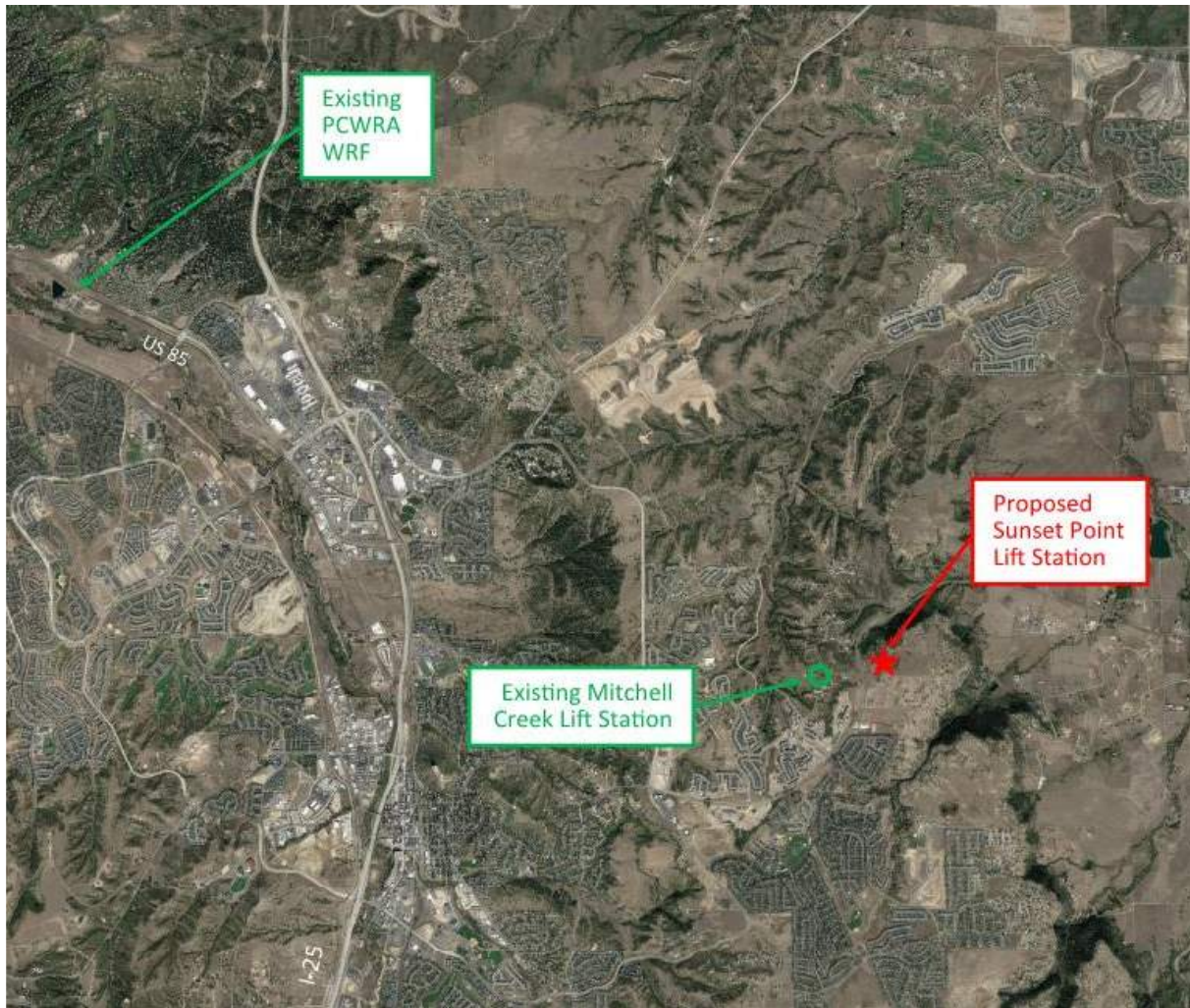


FIGURE 2-2: EXISTING AND PROPOSED WASTEWATER FACILITIES
(NOT TO SCALE)

SECTION 3: DESIGN CONDITIONS

3.1 LIFT STATION CRITERIA

Please provide a statement saying the design of the Force Main and Lift Station facilities will conform to the Town of Castle Rock Wastewater Collection Design Criteria Manual, Chapter 5.

The lift station will be designed according to the State of Colorado's *Design Criteria for Domestic Wastewater Treatment Works* (September 15, 2012) and Castle Rock's design standards. Additional design features will be in accordance with the Cherry Creek Basin Water Quality Authority's (CCBWQA) *Emergency Response Plan Criteria* (October 1, 2020) and Chatfield Watershed Authority standards.

3.2 HYDRAULIC LOADING

The hydraulic loading to the proposed Sunset Point Lift Station is based on the CRW's design criteria. The criteria states a sanitary sewer loading of 200 gpd per SFE and a 10% inflow and infiltration factor. The peak hour flow factor uses the formula: $3.65 \times (\text{Average Daily Flow})^{-0.168}$, maximum of 5.0. Table 3-1 shows the ultimate flows. A copy of CRW's design criteria is provided in Appendix B.

Table 3-1: Sunset Point Lift Station Initial Wastewater Flows

Type	SFEs	Average Daily Flows (gpd)	Peak Hour Flows (gpm)
Residential (single-family)	525	105,000	365
Inflow & Infiltration (10%)	n/a	10,500	7
Totals	525	115,500	372

3.3 WATER QUALITY

The wastewater generated by Sunset Point will be domestic. The development will not contain any industrial or commercial facilities.

3.4 SITE CONDITIONS

To the immediate north and west of the proposed Sunset Point Lift Station site will be park or open space areas with Mitchell Gulch further to the west. To the east and south will be private homes. Presently, all of the surrounding areas are undeveloped.

The proposed lift station will be approximately 200 feet from the nearest home. This will provide a reasonable distance to mitigate odors, noise, and its visual impact.

3.5 FORCE MAIN AND METERING

The proposed lift station will pump into a 6-inch diameter C900 DR18 PVC force main. The force main's total length will be approximately 5,125 lineal feet to an existing sanitary sewer manhole. The proposed pumping rate of approximately 400 gpm will result in a velocity of approximately 4.41 feet per second (fps), which exceeds CDPHE's minimum velocity of 2.0 fps and satisfies the requirements of CPNMD.

One requirement by the CCBWQA is the facility must have two flow meters. The first will be located immediately downstream of the proposed lift station. The second is at the discharge from the force main into the existing outfall manhole. The flows from the two meters will be monitored by a SCADA system.

3.6 ODOR CONTROL

CRW typically uses an aeration system in the wet well to reduce odor potential at the facility and in the force main. In addition, CRW may request a 55-gallon drum of Centaur Carbon (activated carbon) with a metering pump to mitigate odors during initial start-up and if there is an upset at the proposed facility.

SECTION 4: ALTERNATIVES ANALYSIS AND SELECTED ALTERNATIVE

4.1 ALTERNATIVES ANALYSIS

4.1.1 No Action

The Sunset Point site will be developed and sanitary sewer service is required. Thus, “no action” is not a viable alternative.

4.1.2 Gravity Sewer Line

The Sunset Point site lies at a low point in the area and is separated from CRW’s existing sewer collection system by Mitchell Gulch. Thus, a gravity pipeline is not a viable option.

4.1.3 Alternative Service Provider

Sunset Point has been included in CRW’s service area and its sanitary sewer system is very close to the proposed lift station. No other wastewater service providers is within four miles of the development. Thus, inclusion into another utility’s service area is not a reasonable option.

4.1.4 Selected Alternative

There is only one viable option for Sunset Point – a new lift station. The site’s characteristics require pumping and a force main to reach the existing Mitchell Creek Lift Station.

4.2 SELECTED ALTERNATIVE DESIGN FEATURES

The proposed lift station will be designed based the CRW’s criteria, which is consistent with municipal practices and equipment. The lift station is located within the CCBWQA boundary and upstream of Cherry Creek Reservoir. The proposed lift station equipment is consistent with other existing and recently approved lift stations in the CCBWQA boundary. Some design features include:

1. Duplex self-priming pumps
2. Emergency overflow storage
3. Standby emergency power
4. SCADA and autodialer system

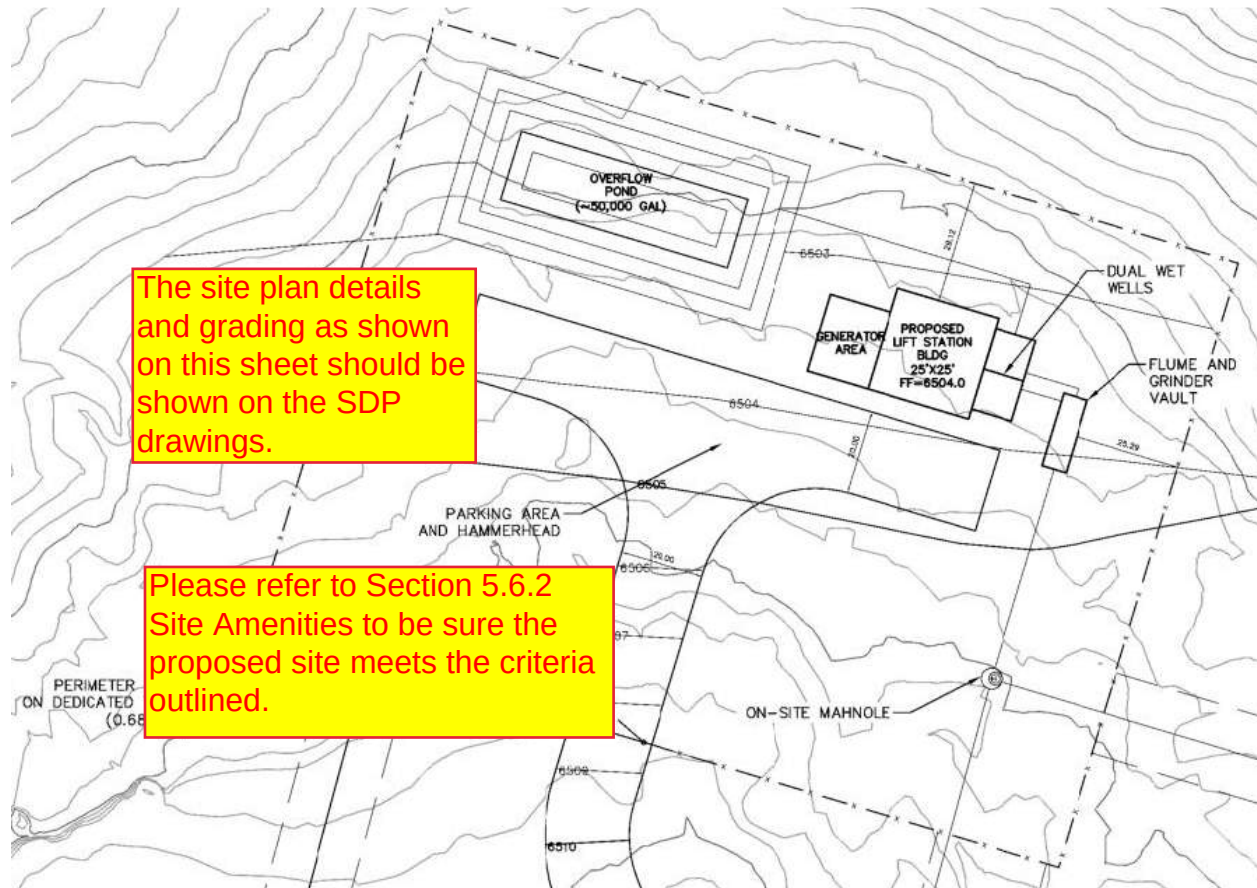


FIGURE 4-1: PROPOSED SITE PLAN
(NOT TO SCALE)

4.2.1 Pumping System

The pumping rate for the lift station is approximately 400 gpm. This flowrate will ensure a 3-inch solid is passed and will maintain a velocity of at least 2 fps in the force main. The proposed pumps for the facility will be self-priming by Gorman-Rupp. A duplex setup will provide for redundancy, with a “lead” and “lag” operation.

The wet well will be sized to have a maximum storage volume of one hour of average day flow. It will contain controls that will alternate the “lead” pump. The instrumentation will activate the “lag” pump if the “lead” pump fails. The controls will also have a setting that will activate both pumps if the “lead” pump cannot keep up with influent flows. The control panel will be programmed to send out an alarm during any failure condition.

4.2.2 Emergency Overflow Storage

A requirement of the CCBWQA is to provide emergency storage for raw sewage in the event of a lift station failure (Table 2, Section V). The criteria states that the storage volume is “equal to the amount of time required to respond and rectify the problem spill.” Two hours of response time at peak hour flow will be adequate for the proposed Sunset Point Lift Station. The proposed facility will be located along well traveled and maintained roadways (Mikelson Blvd and local paved streets). For the proposed Sunset Point Lift Station, the initial two-hour overflow storage will be approximately 50,000 gallons and will be a lined pond. The overflow storage does not include any volume in the

wet well or pipelines. The surrounding site will be graded so that precipitation run-off will drain away from the overflow pond. Furthermore, the overflow storage will be easily accessible to response vehicles to facilitate operation and maintenance. Both the lift station and overflow storage pond will be located outside of the 100-year floodplain.

4.2.3 Standby Power

The proposed Sunset Point Lift Station will have a standby diesel generator sized to power all electrical functions of the facility. The generator has an automatic transfer switch activates the generator when the primary power fails.

4.2.4 SCADA, Metering, and Autodialer

The proposed lift station will have a SCADA system that will record operational data. The proposed facility will have two magnetic flow meters to monitor the discharge. One magnetic flow meter will be immediately downstream from the pumps and the other will be located at the outfall of the force main into the first manhole. An autodialer will notify the operators in the event of a failure, and low and high levels in the wet well.

4.2.5 Force Main

The force main on the discharge side of the proposed lift station will be 6-inch diameter pipeline. The alignment is approximately 3,550 lineal feet of new pipe and 1,575 lineal feet of existing pipe (total of 5,125 lineal feet), and the force main will discharge into an existing sanitary sewer manhole. The force main's material will be C900 PVC, DR18.

SECTION 5: MANAGEMENT AND FINANCE

5.1 OWNERSHIP AND MANAGEMENT

After construction of the proposed lift station, it will be owned and operated by CRW. The Applicant is financially responsible for the permitting, design, and construction of the facility.

CRW is a municipal government and provides service to over 18,041 homes and businesses. Its annual operations and maintenance budget is \$3.14 million and it has the financial means to provide proper operation and maintenance of the proposed Sunset Point Lift Station.

5.2 OPERATIONS AND MAINTENANCE

The proposed lift station will be operated by CWR, which has an operations staff of 1 personnel and will provide the following services:

- Provide a licensed operator designated as the Operator in Responsible Charge (OCR).
- Provide licensed operators to perform all work associated with the facility.
- Perform inspections of the lift station equipment.
- Perform routine maintenance including an annual service of the pumps and motors.
- Perform repairs.
- Respond to all alarms and emergencies.
- Prepare all required documentation and reports.

5.2.1 Preliminary Operating Plan

Provided below is the facility's proposed preliminary operating plan:

- The lift station is operated by CRW personnel; the facility is checked daily.
- The operator monitors run times and pump conditions.
- The operator will clear debris from the pumps.
- The operator will conduct a bi-annual inspection of the wet well.
- The pumps will receive an annual service, which will remove the pumps to be maintained off site.
- The operator will conduct periodic testing of the alarms, SCADA system, automatic transfer switch and generator.
- A SCADA system will monitor operating levels, emergencies, and notify staff of any failures.
- Operator in Responsible Charge is Richard Platt Williams.

5.2.2 Emergency Response Plan

CRW has an existing Emergency Response Plan (“ERP”) and the information and procedures for the proposed Sunset Point Lift Station will be prepared and added. The ERP has response protocols and duties, contact numbers, equipment lists, reporting procedures, safety equipment, and other information. The ERP is included in Appendix E.

5.3 PROJECT SCHEDULE

Table 5-3 shows the anticipated completion schedule for the proposed Sunset Point Lift Station.

Table 5-3: Schedule

Milestone	Completion Date
Submit Site Location application and PER to referral agencies (Town of Castle Rock, Tri-county Health, CCBWQA and PCWRA)	August 2022
Submit Site Location application and PER to CDPHE	September 2022
Site Location & PER approval from CDPHE	November 2022
Final Design of Lift Station	January 2023
Submit BDR and plans to CCBWQA and CDPHE	January 2023
Design and BDR comments from CDPHE	March 2023
Design and BDR approval from CDPHE	April 2023
Complete construction of Lift Station	December 2023
Start-up of Lift Station	January 2024
First house in the Sunset Point occupied	February 2024

Appendix A Proof of Ownership

Appendix B
Castle Rock Water Design Criteria and Calculations

Sunset Point Lift Station**Hydraulics and Calculations**

Flow Projections

Date: May 2022

MSK Project: 25-001-02

Calc'd by: DLT

PRELIMINARY**4/12/22****Assumptions:**

SF Detached ADF: 200 gpd/DU

Peaking factor: $3.65 \times (\text{Average flow in mgd})^{-0.168}$

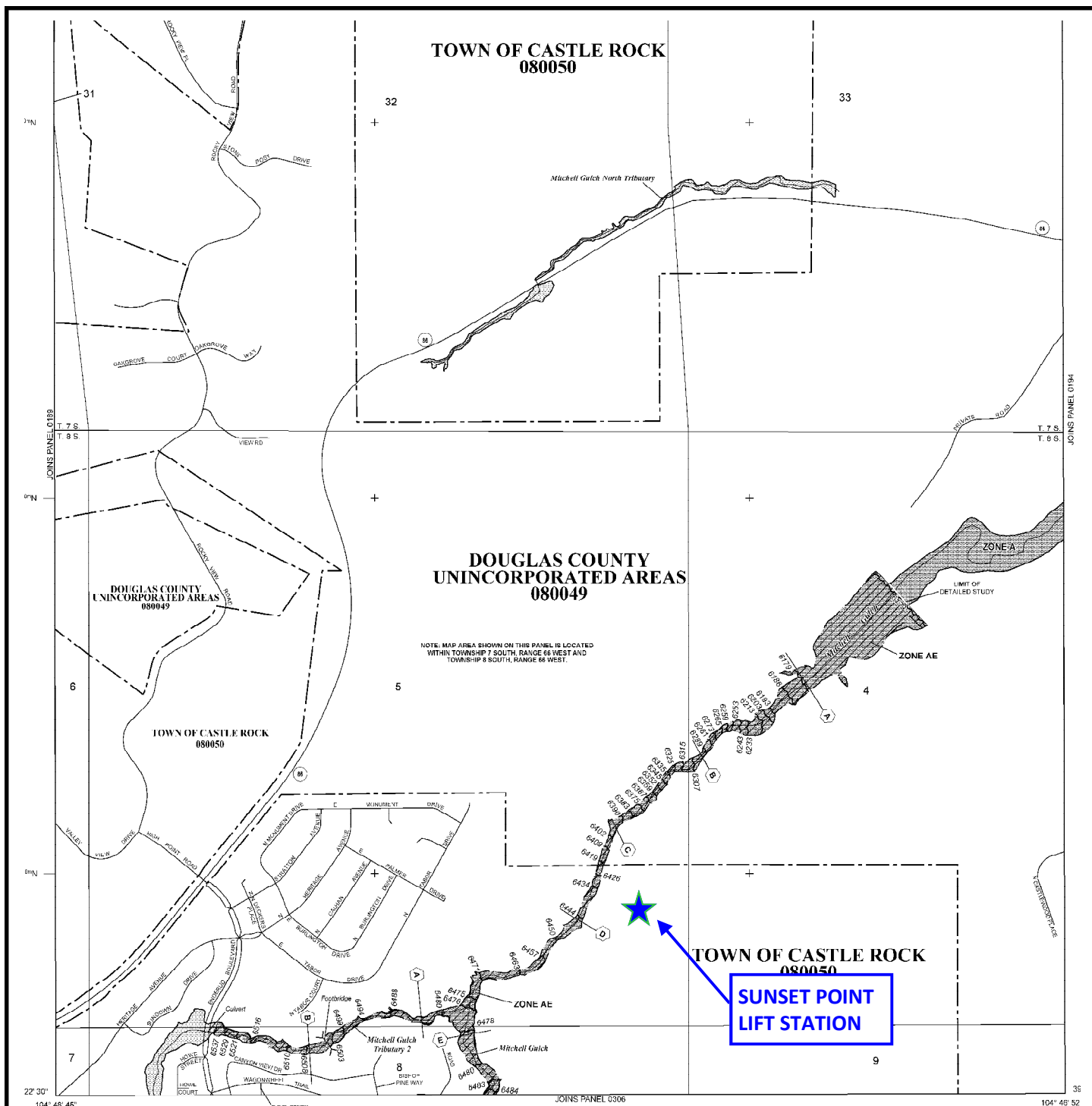
Peaking factor (Max.): 5.0 times Average Day Flow of entire basin

Inflow/infiltration: 10% of ADF

Table B1-1: Ultimate Wastewater Loading

A	B	C	D	E	F	G	H
No.	Description	Total Units	Average WW (gpd)	Average WW (mgd)	Peaking Factor	Peak Flow (mgd)	Peak Flow + I/I (gpm)
1	Sunset Point Phase 1	275	55,000	0.055	5.0	0.275	191.0
2	Sunset Point Phase 2	250	50,000	0.050	5.0	0.250	173.6
4	Inflow and Infiltration (10%)	n/a	10,500	0.011	n/a	n/a	7.3
Totals		525	115,500	0.116		0.525	371.9

Appendix C Floodplain Map



7157 S. Andes Circle
Centennial, CO 80016
303.903.0918

Source: FEMA FIRM
Map, Panel 0193G
(March 16, 2016).



SUNSET POINT LIFT STATION

Figure C-1

Floodplain Map

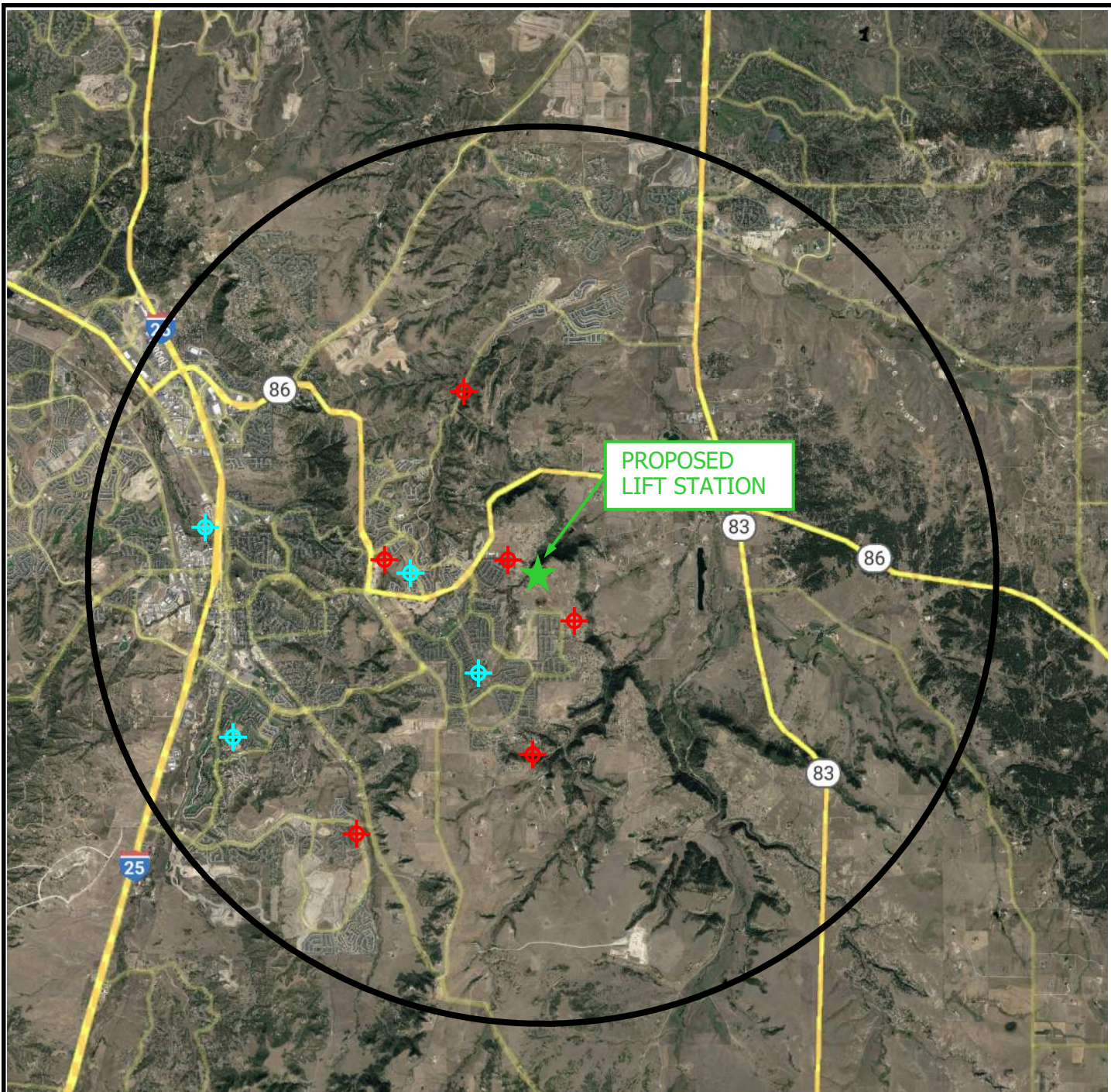
August 2022

Scale: N.T.S.

Appendix D

Figure D-1: 5-mile Radius Map

Figure D-2: 1-mile Radius Map



Legend

-  Water Treatment Facility
-  Lift Station



7157 S. Andes Circle
Centennial, CO 80016
303.903.0918



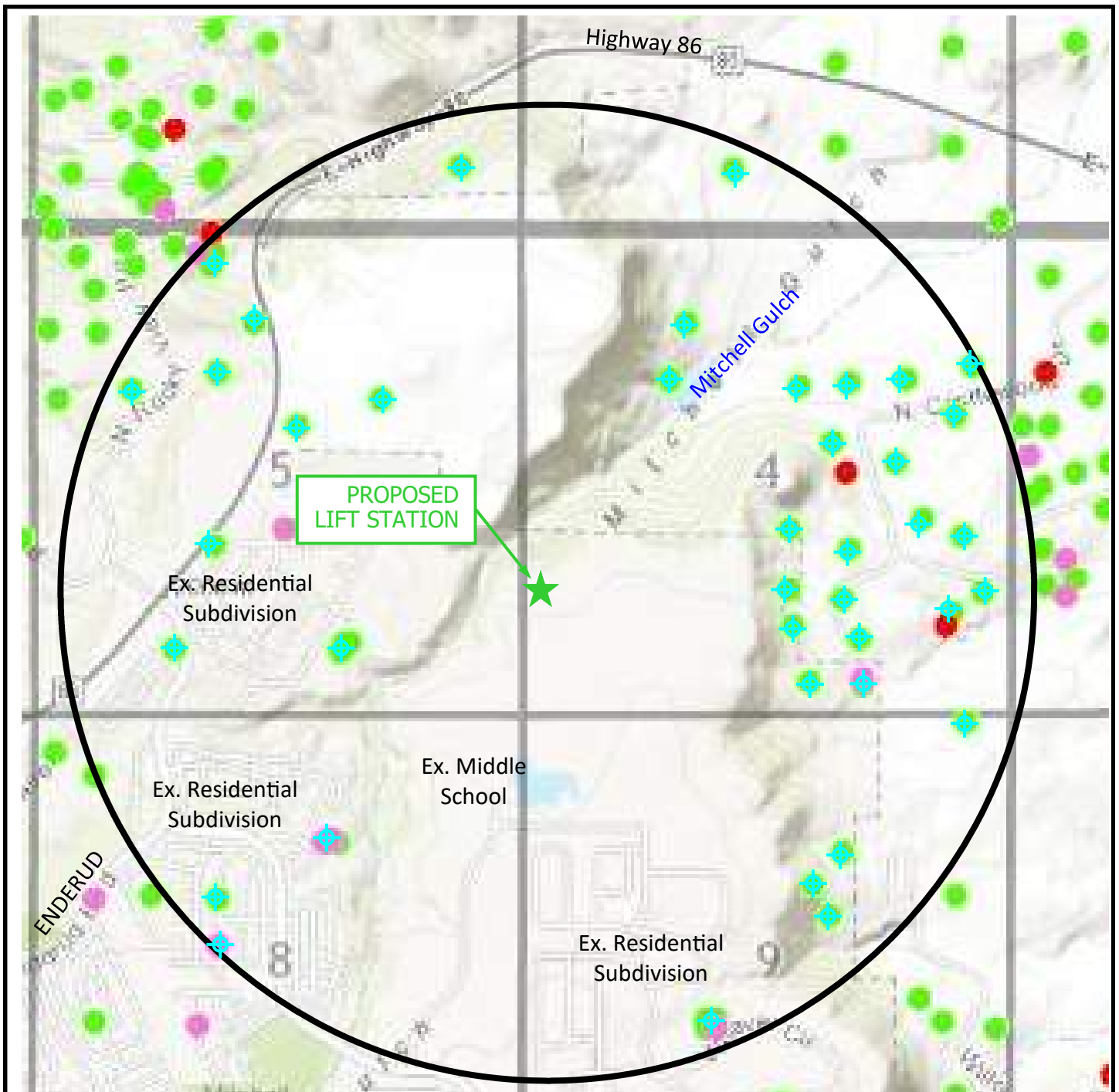
SUNSET POINT LIFT STATION

Figure D-1

5-Mile Vicinity Map

August 2022

Scale: N.T.S.



Legend



Permitted Well

Note: Some of the “dots” on the map represent denied well permit applications, monitoring wells, abandoned wells, or expired permits.



7157 S. Andes Circle
Centennial, CO 80016
303.903.0918

Source: AquaMap from
the Colorado Division of
Water Resources.



SUNSET POINT LIFT STATION

Figure D-2

1-Mile Vicinity Map

August 2022

Scale: N.T.S.

Appendix E Emergency Response Plan

SUNSET POINT LIFT STATION

EMERGENCY RESPONSE PLAN

PREPARED FOR:

CASTLE ROCK WATER
175 Kellogg Court
Castle Rock, CO 80109

Issue Date: June 8, 2022

PREPARED BY:



MSK Consulting, LLC
7157 S. Andes Circle
Centennial, CO 80016

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APPENDICES

- Appendix A: Lift Station Drawings**
- Appendix B: Equipment List**

SECTION 1: INTRODUCTION

1.1 PURPOSE

The purpose of this Emergency Response Plan (“ERP”) is to summarize the emergency response activities for the Sunset Point Lift Station. The manual will provide a means for fast and effective response to emergency situations and to minimize the impact or effects of an incident. Rapid and proper response is crucially important as the Sunset Lift Station is upstream of the Reuter-Hess Reservoir, which stores water for potable use.

An emergency is defined as any event at the lift station facility that if left unattended may result in a public health risk, damage to the environment or public/private property, and for which Castle Rock Water (CRW) is ultimately responsible. An emergency is the result of failure of electrical, mechanical, and/or control systems.

1.2 LOCATION

The proposed Sunset Point Lift Station will be located in the Sunset Point development in Douglas County, state of Colorado within the Town of Castle Rock. The Sunset Point Lift Station lies in the SE quarter of Section 5, Township 8 South, Range 66 West of the 6th Principal Meridian.



FIGURE 1-1: LOCATION MAP

(NOT TO SCALE)

1.3 EMERGENCY SITUATIONS

The following is a list of possible emergency situations. This list is not to be considered to be a complete list as other possible scenarios may exist.

- Alarm notification from SCADA system
- Visual indication of sewage around facility or overflow ponds
- Report of a sewer smell or sewerage on the ground in any specific area by a homeowner.
- Electric power outage reported in this area.

For purposes of this ERP, a spill could include the following materials:

- Wastewater
- Chemicals
- Petroleum products
- Grease
- Grit

1.4 FACILITY INFORMATION

The Sunset Point Lift Station has the following design features and equipment:

- Gorman-Rupp pumps with a pumping capacity of 400 gpm.
- 8'x8' wet well with an operating volume of approximately 6,500 gallons.
- 50,000-gallon overflow pond providing 2.0 hours of response time.
- Standby diesel generator with a fuel tank sized for 24 hours of continuous operation.

1.5 ACRONYMS

CCBWQA	Cherry Creek Basin Water Quality Authority
CDPHE	Colorado Department of Public Health & Environment
CDPWR	Colorado Primary Drinking Water Regulations
CRFR	Castle Rock Fire and Rescue
CRPD	Castle Rock Police Department
CWA	Chatfield Watershed Authority
FM	Force Main
PCWRA	Plum Creek Water Reclamation Authority
PWSD	Parker Water and Sanitation District
SCADA	Supervisory Control and Data Acquisition
WQCD	Water Quality Control Division

SECTION 2: ROLES, NOTIFICATION, AND ROUTINE MAINTENANCE

2.1 PERSONNEL

Any person engaged in any operation or activity which results in a spill or discharge of a substance which may pollute State waters contrary to the Water Quality Control Act must notify CDPHE as soon as he has knowledge of the spill or discharge. Because the Sunset Point Lift Station is within PCWRA's service area, a copy of the incident report must be sent to PCWRA. Because the Sunset Point Lift Station is upstream of Reuter-Hess Reservoir, PWSD and CCBWQA must be contacted.

The Operator of Responsible Charge ("ORC") is responsible for:

- Development, implementation and review of CRW's emergency procedures.
- Ensure adequate training of CRW personnel.
- Providing proper equipment for CRW personnel.
- Coordination with responding agencies.
- Notification to authorities and reporting.
- Estimating and recording quantity of sewage spill,
- Recordkeeping.
- Technical support.
- Recording the time an emergency was declared.
- Recording the names, assignments, time of arrival and departure of response personnel.
- Recording the cause of the incident and steps taken to restore lift station.
- Recording the time mitigation was completed.
- Taking a photographic record of the incident.
- Public/media relations.
- Notification/reporting.
- Technical support.

CRW has five certified collection system operators during business hours and on-call staff including certified operators for after hours.

2.2 NOTIFICATION

This section outlines the notification procedures for emergency response and contacting regulatory and other agencies.

2.2.1 Decision to Notify

1. The ORC will make the decision whether to notify CDPHE. It is understood that the ORC will notify the CDPHE unless it is very clear that notification is not required.
2. Any CRW representative who is contacted about a spill should immediately notify the ORC. Be certain to obtain the NAME and TELEPHONE NUMBER of the person calling.
3. The ORC will investigate any problems reported to him and make a decision whether to notify CDPHE.

4. The ORC will note in writing the TIME and DATE of telephone notification, and the NAME of the CDPHE representative he spoke to.

2.2.2 Manner of Notification

1. The ORC or designee will notify CDPHE immediately, by telephone, as follows:
CDPHE spill hotline: 1-877-518-5608
2. The ORC or designee will notify PWSD immediately, by telephone, as follows:
PWSD emergency number: 303-841-4627 (press "4" for after hours contact)
3. The ORC or designee will notify PWSD will notify the PCWRA, CCBWQA and CWA.

2.2.3 CRW Contact Numbers

ORC – Field Services Superintendent	
Desk	720-733-6071
Cell	303-435-3647
Emergency On-Call Duty Phone	303-435-4472

2.2.4 Off-site Responders

CRFR (Fire) - Primary Emergency Responders 911
CRPD (Police) - Primary Emergency Responders 911

2.2.5 Designated Local Emergency Medical Facility

See the Town of Castle Rock Designated Provider Information.

2.2.6 Agency Contacts

Cherry Creek Basin Water Quality Authority
303-779-4525

Parker Water and Sanitation District
303-841-4627

Plum Creek Water Reclamation Authority
303-688-1991

Chatfield Watershed Authority
303-916-4645

2.2.7 Contractor List

MacDonald Farms
P: 303-772-4577

2.3 ROUTINE MAINTENANCE

CRW staff performs the following routine maintenance tasks:

- Equipment maintenance will occur according to manufacturers' specifications.
- Schedule and program for inspection : Live Operators monitor daily via SCADA, and Certified Collections Operators perform on-site physical inspections three times per week.
- Alarm testing: Three times per week to ensure auto-dialer function.
- Backup power testing schedule: Backup engine tested weekly; PMs quarterly. The automatic transfer switch is exercised weekly; PMs quarterly.
- Valve exercise schedule: Once per week for valves inside the station

SECTION 3: RESPONSE PROCEDURES

3.1 LIFT STATION PROCEDURES

3.1.1 Situation: Lift Station Failure Caused by Primary Power Failure

1. Dispatch crew to the lift station.
2. Request the assistance of the power company, CORE, (1-800-332-9540) in restoring power to the station. Determine the estimated time of arrival of the power company crew and then notify the ORC.
3. Check any overhead power lines for fuses that might have blown or downed power line as they approach the pumping station. If the operators notice a blown fuse or downed power line, identify the pole number(s), and notify the ORC to relay to the power company the location and pole number(s).
4. Check if standby generator is operating.
5. Check fuel level of the standby generator. If fuel is required, contact fuel supplier for delivery.
6. If the generator is not operating, contact the ORC and obtain the portable generator.
7. If an overflow or spill has occurred, assure that the ORC has been contacted and take steps to mitigate the spill. See Section 3.2.
8. Once the power company notifies the crew that the primary power source has been restored, shut down the portable generator and disconnect from the auxiliary power connection.
9. The crew should monitor the pumps to ensure that the pumps follow their normal lead and lag operation including the start and stop operating level.
10. Monitor several complete pumping cycles before leaving the station.
11. Notify the ORC that power has been restored and to verify that the alarm condition is cleared from the alarm panel.
12. Complete a report per CRW policies.

3.1.2 Situation: Lift Station Failure Caused by Mechanical Failure

1. Locate the cause for failure of the lift station.
2. If one pump failed, isolate failed pump by closing valves and activate second (standby) pump.
3. If mechanical failure does not allow for any of the pumps to operate, then contact the temporary pump contractor for delivery of a portable pump.
4. Obtain a portable backup pump to bypass the lift station. Once on site, connect and start-up.
5. Check wet well and if wet well requires man entry, follow the OSHA safety requirements for confined space entry.
6. If the cause is related to pump failure, repair pumps as necessary.
7. If the cause is related to material failure of some portion of the lift station or piping, isolate the area of the failure and repair as necessary.
8. If an overflow or spill has occurred, assure that the ORC has been contacted and take steps to mitigate the spill. See Section 3.2.
9. Prior to starting up the lift station after repair and spill mitigation, check the lift station for possible damage due to the sudden shut down.

3.1.3 Situation: Lift Station Failure Caused by Force Main Break at the Facility

1. Identify if the wet well is being flooded.
2. Determine if the force main has separated flooding the lift station.
3. If the failure has occurred in a location that does not prevent a portable pump from working, request and obtain a portable pump.
4. If an overflow or spill has occurred, assure that the ORC has been and take steps to mitigate the spill. See Section 3.2.
5. Otherwise, notify ORC, and call additional crew to connect the portable pump including all lengths of suction and discharge hose to the lift station.
6. Monitor the atmospheric conditions while working in the dry side of the station.
7. Upon arrival of the portable pump, connect the appropriate lengths of suction hose that will suspend into the wet well, then connect hose to quick connect on force main.
8. Go through the procedures for starting the portable pump, and begin pumping.
9. Make the necessary repairs to the force main.
10. Once the repair has been completed, shut down the by-pass operation. Do not disconnect the hose until the repair has been properly inspected for leaks.
11. If no leakage is observed, return all pump controls to their original operating position.
12. Restore the main line disconnect to its original position by removing the lock out tag out.
13. Monitor pumps to ensure that the pumps follow their normal lead and lag operation including the start and stop operating level.
14. Monitor several complete pumping cycles before leaving the station.
15. Notify the ORC that power has been restored and to verify that the alarm condition is cleared from the alarm panel.
16. Complete a report per CRW policies.

3.1.4 Situation: Lift Station Alarms

1. Send an on-call operator to the station within *ten (10)* minutes of receiving the alarm. If serious trouble is found, call for additional assistance and keep an individual at the station until further instructions are received.
2. Always check with CORE, (1-800-332-9540) when an alarm goes on to see if there is a power outage in the area. The pole number nearest the station should be reported to the ORC.
3. In all wet wells the operating level is below the inlet. Consequently, if sewage is not flowing into the wet well a sewage backup upstream of the lift station occurred.
4. Personnel called in to investigate lift station alarms shall respond to the station even if the alarm has cleared prior to their arrival. All alarm conditions are to be checked and logged. Use the following guidelines and follow confined space entry procedures as applicable:
 - Take your time entering the station.
 - Note any unusual odors, i.e., burning electrical equipment or paint.
 - Observe the SCADA panel for abnormal operation and alarms.
 - Listen and note any unusual noises.
 - Observe pumps, controls, and piping of equipment in the station. Note anything which looks out of place.
 - Record all gauge reading, i.e., wet well level, hour meters, flow charts, on-off levels, psi gauges on pump, rpm, and anything significant.
 - Fill out lift station log book.
 - Call ORC and use notes to make your report (of a potential problem).
 - Consult the detailed lift station emergency procedure for any further action which may be required.
 - A lift station alarm call out report must be filled out completely and forwarded to the ORC for all alarms received from the lift station.
 - Responding operator needs to be absolutely certain that the cause of the lift station alarm or failure has been properly identified and corrected prior to leaving the station.
 - Signal line failures from lift stations are to be reported to the ORC. The circuit line number from the station is reported to and the station is to be checked once a shift (8 hours) until the signal line is repaired.
 - Reset any/all alarm feature indicator lights.
5. If lights are on in the station but pumps will not operate in “Manual,” check wet well level. Call in an electrician. Initiate by-pass pumping operation.
6. Do not open the pump control panel to look for the reset buttons. Before pressing an exposed reset button in any station, be sure the breaker and toggle switches are “off”.

Once this is confirmed, perform the following three steps:

- Press and release the reset button(s),
 - Turn “on” the main breaker, and
 - Test all the toggle switches.
7. If the equipment initially appears to be running satisfactorily, wait five minutes to make certain the equipment does not go offline again. If it does, DO NOT try this resetting procedure again. Instead, call electrical contractor.
 8. If the station cycles three (3) times without any trouble, most likely it is an alarm problem. Notify technical support for the SCADA system. Check station once per shift until alarm trouble is repaired.

3.2 SPILL CONTAINMENT AND MITIGATION

1. If it is imminent that the wastewater will be released into receiving waters or a drinking water supply watershed, then the ORC should be notified. The ORC will notify people who will notify the proper authorities and agencies (see Section 2.2).
2. Call emergency response contractors to set up flotation booms across streams, gulches, etc., initiate by-pass pumping as necessary.
3. Request the vac truck.
4. Direct the spill to the overflow pond.
5. If overflow pond is full, then initiate and removal of debris and organic matter from the affected area.
6. If the wastewater is in the streets/roads (public or private), then contain the wastewater as best as possible with sand bags or other industry accepted alternatives to minimize any impact to public health or the environment.
7. Sand bag nearby catch basin inlets to prevent the wastewater from entering the drainage system and causing potential contamination to the tributary receiving waters.
8. If ponding should occur on the street or easement (public or private), cordon off the area.
9. Remove as much of the contaminant as possible.
10. Disinfect the ponding areas with an industry standard disinfectant and notify the surrounding homes.



Preliminary Utility Report Checklist

The Preliminary Utility Report must be in conformance with the latest Town of Castle Rock Water and Wastewater System Design Criteria Manuals, available on the Town's website.

For the Preliminary Utility Report, information contained in the Concept Utility Letter shall be updated to reflect the latest projections for land use and densities. Hydraulic modeling shall only be required for the site proposed in the Site Development Plan (SDP). This modeling may be waived on a case-by-case basis at the discretion of the Utilities Department if it is adequately demonstrated that the SDP is already consistent with the Town's Water/Wastewater Master Plans and that the existing adjacent water/wastewater infrastructure is adequate to support the development without modifications or if the SDP is for a commercial structure on a single lot. The modeling shall accurately reflect the sizes and locations of all proposed water mains associated with the SDP layout. In addition to providing updated land use and density information, the following items shall be specifically addressed:

- Further analysis of any concerns raised in the Concept Utility Letter regarding the Town's ability to serve the development.
- Updated discussion of appurtenant water/wastewater facilities other than distribution mains that will be necessary to serve the development, and the principal design parameters that will be utilized in the final design of such facilities.
- Status of any variances that have been obtained, or will be pursued.
- Updated discussion of maintenance access and any associated concerns.
- Updated status of permitting requirements.
- Updated appendices.

The following outline sets forth the **required minimum** content to be provided in the Preliminary Utility Report that shall be submitted with the SDP. This report must be prepared by, or the report preparation supervised by a registered Professional Engineer licensed in Colorado. A copy of this checklist must be submitted with the Preliminary Utility Report.

Please check off the following items to assure your report is complete. Appropriate notations shall be provided with the checklist. For example, if a specific item is not addressed or not applicable, an explanation needs to be provided.

Included	N/A	
		TITLE SHEET
✓		A. Name of Project, including legal name of development
✓		B. Address
✓		C. Owner
✓		D. Developer
✓		E. Engineer
✓		F. Submittal date and revision dates as applicable

Preliminary Utility Report – Formatting Checklist

Included	N/A	
✓		APPROVAL BLOCK SHEET (Available on Town's website)
✓		TABLE OF CONTENTS
		PROJECT LOCATION AND DESCRIPTION
✓		A. Site Location
✓		B. Description of Property and Land Use
		CALCULATED WATER DEMANDS
✓		A. Average Day Demands (ADD)
✓		B. Max Day Demands (MDD)
✓		C. Peak Hour Demands (PHD)
		EXISTING WATER SYSTEM
✓		A. Existing Distribution System
✓		B. Existing Supply Facilities
		PROPOSED WATER SYSTEM
✓		A. Proposed Distribution System
✓		B. Proposed Supply Facilities
✓		C. Land Dedication Requirements
		PROPOSED WATER SYSTEM ANALYSIS AND MODELING
✓		A. Hydraulic Models
✓		B. Hydraulic Modeling Scenarios
✓		C. Hydraulic Modeling Output and Required Schematics
		CALCULATED WASTEWATER FLOWS
✓		A. Average Day Wastewater Flows (ADF)
✓		B. Peaking Factor
✓		C. Peak Design Flows (PDF)
		EXISTING WASTEWATER SYSTEM
✓		A. Existing Collection System
		PROPOSED WASTEWATER SYSTEM
✓		A. Proposed Collection System
✓		B. Proposed Wastewater Facilities
✓		C. Land Dedication Requirements
		PROPOSED WASTEWATER SYSTEM ANALYSIS AND MODELING
✓		A. Hydraulic Models
✓		B. Hydraulic Modeling Scenarios
✓		C. Hydraulic Modeling Output and Required Schematics

Preliminary Utility Report – Formatting Checklist

Included	N/A	
✓		POTENTIAL PERMITTING REQUIREMENTS
✓		REFERENCES
		APPENDICES
✓		Appendix A — Water Demands
✓		Appendix B — Water Storage
✓		Appendix C — Water Hydraulic Analysis and Modeling
✓		Appendix D — Wastewater Flows
✓		Appendix E — Wastewater Hydraulic Modeling
✓		Appendix F — Maps and Plans
✓		A. Vicinity Map
✓		B. Utility Map(s) provided by the Utilities Department
✓		C. Site Development Plan
✓		D. Water/Wastewater Utility Plan(s)

Notes/Comments: